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Recent Developments of Electrical Equipment for the Rubber Industry

A Review of Improvements in Motors Operating Banbury Mixers and Dynamic Braking Starters

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AS an individual machine the Banbury mixer ranks as one of the largest users of power in the rubber industry and its advantages for the mixing and compounding of rubber are well known. Except for the smaller sizes, synchronous motors are accepted as the most economical and satisfactory drive but the speed at which the machine should operate for maximum production and the power requirements vary with the manufacturing conditions.

During the last year or two a number of installations of Banbury mixers have been made using two-speed motors with a view of obtaining greater production and a more flexible operating condition. Some of these motors were of the squirrel cage induction type but most of them were synchronous and present some interesting phases.

The motor capacity will depend on the size of the Banbury, the speed of the rotors, size and quality of the batch, but motors from 300 to 600 h.p. seem to meet most requirements. For two-speed service whether the motors should be designed for the same horsepower at both speeds or the same torque was also a subject of discussion for some time but with the number of constant torque 2-speed motors now in satisfactory service this point appears settled. It might seem that two consecutive speeds such as 600-900 or 900-1200 r.p.m. would be desirable instead of ratios of 2 to 1, but since any ratio other than 2 to 1 with synchronous motors involves two complete stators and rotors, motors with 2 to 1 speed range have been used in all cases and appear to satisfactorily meet the requirements.

These synchronous motors are designed for constant torque service continuous operation, 40° rise at either speed, and for 100% or 80% power factor as may be required. The motor primary windings are of the conventional single winding type as used on two-speed induction motors. The field windings are also built along standard lines but are connected in two groups to four collector rings so that by means of the control equipment they may be connected for either high speed or low speed operation.

It is generally agreed that motors for Banbury mix-

This article is abstracted from a paper delivered by the author before the October 15th meeting of the American Institute of Electrical Engineers at Akron, Ohio.

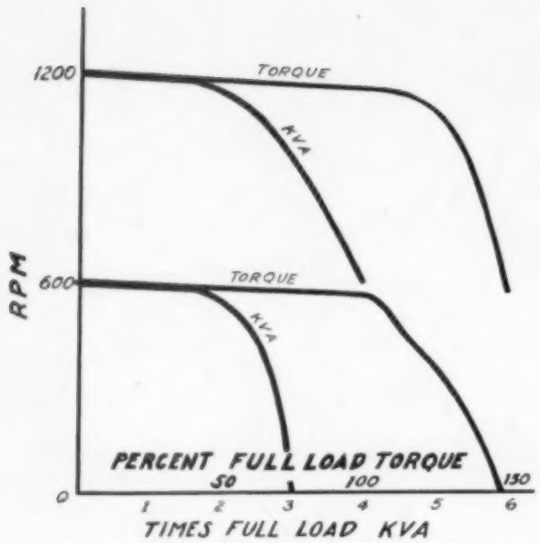

FIG. 1—Typical speed-torque characteristics of a 500/250 h.p., 1200/600 r.p.m. synchronous motor.

ers should have high starting and pull-out torques and most synchronous motors, either single or two-speed have been designed to give approximately 150% starting torque, 100% pull-in torque and 200 to 250% pull-out torque. Two-speed motors are necessarily a compromise, and a design to meet the conditions of high pull-out and starting torque at both speeds is not the most favorable from the standpoint of KVA inrush when starting on full voltage on the high speed connection. Since the starting KVA on the low speed is much lower than on the high speed it is a simple matter to arrange the magnetic control so that the motors always start on low speed regardless of whether the high or low speed button is pressed but will automatically accelerate to the high speed if that button is pushed. When operating at either speed the pressing of the other button will automatically change the speed without the necessity of stopping and restarting.

Dynamic Braking Unnecessary on Banburys

Fortunately dynamic braking is not necessary on Banbury mixers, since to obtain this on a two-speed motor under all conditions would very materially complicate the control. Provision for reverse operation is, however, necessary either to facilitate the starting after a stop with full load or for machine adjustments. In most cases it is apparently feasible to mount the control panel sufficiently close to the operator so that for these reversing operations the use of manual reversing switches on the control panel are satisfactory. If the control is mounted remotely as in a control room, then magnetic reverse contactors or circut breakers are required.

Figure 1 shows the starting characteristics of a typical 500 h.p. two-speed synchronous motor, 1200-600 r.p.m. A starting torque on the low speed connection of 150% of full load torque is obtained with approximately 3.0 times full load KVA. If high speed operation is desired, the motor connections are automatically changed over at a speed of approximately 600 r.p.m., increasing the torque again to about 150% or over and the KVA to approximately 4 times full load value.

The schematic motor connections are shown in Figure 2 for the low speed and high speed operation. For low speed operation the line is connected to terminals T_1, T_2, and T_3, and the fields connected in two groups to give 12 poles. For high speed operation the line is connected to T_4, T_5, and T_6, with T_1 and T_2, and T_3 short circuited and one group of poles reversed to give 6 field poles.

Figure 3 is a schematic control diagram showing the main line contactors or circuit breakers, the reversing switch with control interlocks and individual overload protection for both high and low speeds. The control sequence is so arranged that the motor is always started on the low speed connection but if the motor is operating at either speed it may be automatically changed to the other speed without pressing the stop button.

Exacting Starting Current Limitations

Although full voltage starting as outlined above is satisfactory for nearly any rubber plant operating on the usual industrial power lines there are cases where the starting current must be kept to much lower values. When located within the business districts of large cities and operating on the 208 volt network system the starting current limitations are very exacting. In Figure 4 a schematic diagram of a 300 h.p., two-speed synchronous motor is shown which uses a 4 point resistance starter to limit the inrush of 1000 amperes per step to meet the network requirements. The motor torque characteristics are similar to those of the 500 h.p. motor (Figure 1) but with reduced voltage starting the torque is reduced so that depending on the load on the motor it may not start until 2 or 3 steps of resistance are cut out.

The accelerating contactors are controlled by individually adjustable timing relays which may be set to best suit the manufacturing or power conditions. The control is so arranged that the motor will start on either the high or low speed connection when the respective buttons are pressed. When changing from one operating speed to the other the starting resistor is again inserted in the circuit and automatically cut out as during acceleration from zero speed. This is a good example of what can be done to use a two-speed syn-

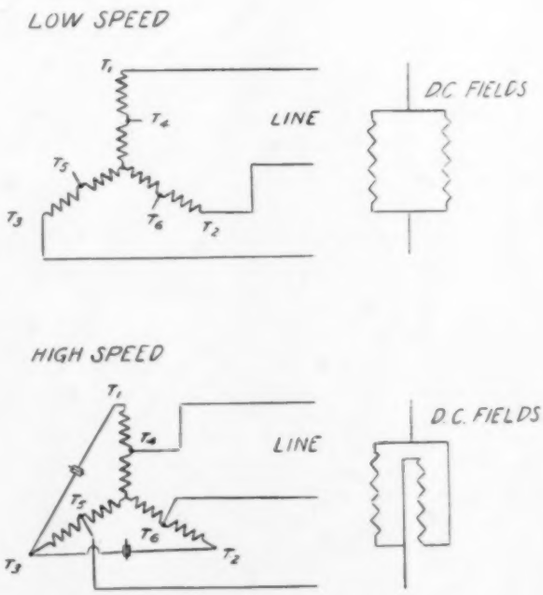

FIG. 2—Schematic connections of a 2-speed synchronous motor.

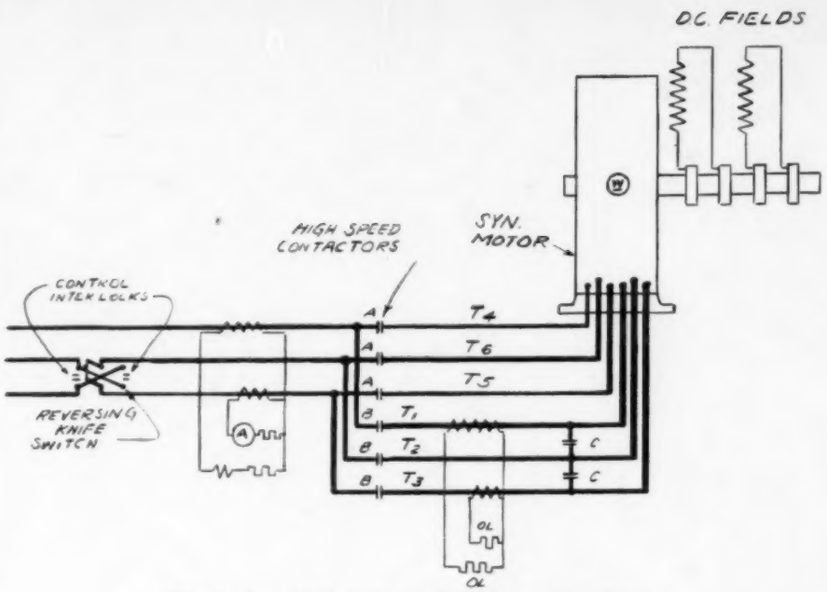

FIG. 3—Control diagram for 2-speed synchronous motor showing arrangement of contactors and protective devices.

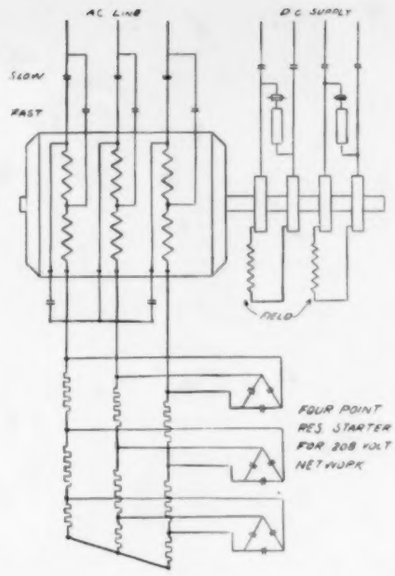

FIG. 4 — Four-point starter with 2-speed synchronous motor.

chronous motor under extreme starting current limitations but ordinarily the full voltage, special sequence control is entirely adequate and much more simple.

It is quite generally accepted that the control for synchronous motors driving mill lines should provide for the three following functions: (1) Full voltage automatic starting; (2) Dynamic braking; and (3) Emergency reversing.

With a general agreement on these features, the number of combinations or arrangements of equipment which are in use is rather surprising. The location of the control is one factor which has a bearing on the decision, that is whether the control is mounted adjacent to the motor or remotely as in the basement or a control room. In the first case, it is generally considered that the control is sufficiently close to the mill so that a manual reverse switch is satisfactory. If mounted remotely, magnetic reverse by means of push-button control is necessary.

Open Construction Controllers

Most of the controllers mounted in the mill room have been of open construction and for high voltage service generally included a manually operated double throw circuit breaker for the reversing feature. An automatic full voltage starter of conventional design is used to which is added the contactor or circuit breaker for dynamic braking. To insure maximum safety to operators, it is conceded that dynamic braking should be obtained by gravity or spring operated devices or a combination of both, and not depend on the closing of operating magnets or breakers. Although numerous arrangements of such equipment are in use, it would appear that, as a more general agreement is reached on the control functions, there is a need and opportunity to simplify and standardize the control equipment.

Regardless of location, there is a very definite trend towards enclosed or cubicle type construction. When installed in the dusty atmosphere of a mill room such enclosures are most essential, but are desirable from the standpoint of safety and maintenance in any location. In Figure 5 is illustrated one type of an enclosed mill line control, the dynamic breaker assembly as shown in Figure 6 consisting of two breakers mechanically interlocked and operated from one magnet. When the operating magnet is de-energized, the dynamic breaker is held in the closed position by a heavy spring.

Although a number of controllers of this type are in service giving entire satisfaction, a new design including manual reverse has been developed in which the running and dynamic breakers have the same operating features as the previous one, but the mechanical arrangement has been materially simplified. The two circuit breakers, mechanical interlocking mechanism and operating magnet are assembled on a heavy steel plate, thus making a self-contained and permanently aligned unit. The small overall dimensions of this breaker assembly with the dynamic braking resistors is also of great advantage when using metal enclosures, or when several units are to be assembled in one location.

In order to obtain a most positive opening of the breaker under all conditions, both a low voltage and a shunt trip coil are used. The safety switches are con-

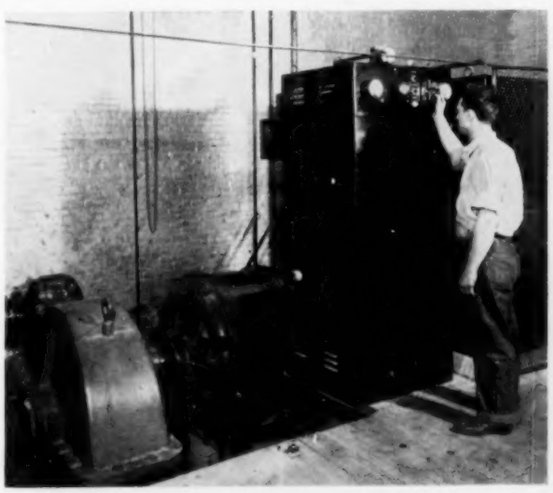

FIG. 5—250 h.p. 4000 volt mill line drive with enclosed type dynamic braking control.

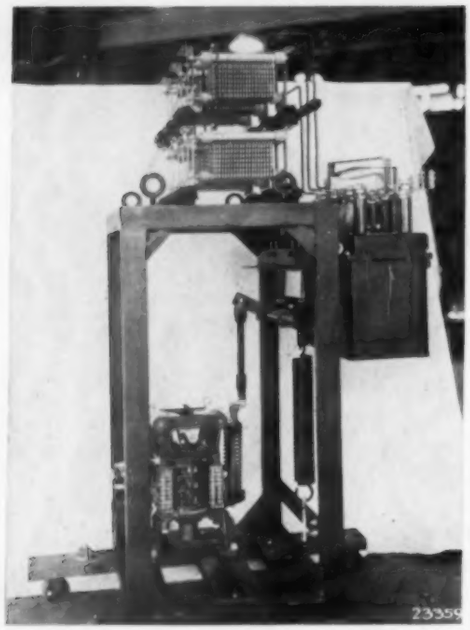

FIG. 6—Breaker assembly which operates magnet, spring and resistor shown in Fig. 5.

nected in the normally closed low voltage circuit while the shunt trip circuit is energized immediately after the opening of the low voltage circuit. A strong external spring in addition to the contact pressure in the running breaker provides rapid acceleration of the moving parts and a quick closing of the dynamic breaker. Oscillograph tests indicate a total time of approximately 0.15 seconds from the opening of the safety switch to the closing of the dynamic breaker contacts or from the de-energizing of the low voltage coil to the closing of the dynamic breaker contacts, a time of approximately 0.088 seconds.

In the modernizing of old distribution and control systems or the laying out of new ones, the trend is definitely towards remote mounting of the control unit, generally in groups to serve certain departments or sections of a department. Such an arrangement involves magnetic reversing, and when the control for several motors is mounted together, a compact design is most essential. A 2-breaker assembly as discussed above is comparatively simple to arrange, but to provide for forward or reverse operation with dynamic braking in either direction requires a more complicated interlocking system.

A very compact reliable arrangement of three breakers for this service is shown in Figure 7. Each breaker with its independent operating mechanism and all mechanical interlocking devices is assembled on a heavy steel plate to insure permanent alignment. The dynamic breaker is located in the center between the forward and reverse breakers and the control is so mechanically and electrically interlocked that this breaker must open before either the forward or reverse breaker can close. After either of the running breakers have closed it is impossible to close the other and the opening of either breaker releases the dynamic breaker which is closed by a heavy spring. The illustration indicates the compact assembly of the three breakers, the operating mechanisms, resistors, transformers, and wiring, while the disconnect switches in this case are mounted in the over-hanging cabinet.

Compact factory assembled units of this type greatly simplify the field installation problem and the grouping of several control units at convenient points effects material savings in the main power distribution and also in the maintenance of equipment. The circuit breakers in this case are rated 600 amperes, 7500 volt and consequently are of sufficient capacity for practically any high voltage mill line motors, although circuit breakers of 800 ampere capacity could be similarly arranged if required.

Although the circuit breakers described above have sufficient rupturing capacity for the majority of plants, there are, however, many of the larger plants in which short circuit capacity at the motor terminals would exceed the breaker capacity. It then becomes a question of how best to obtain proper protection, that is whether to make each of the numerous motor breakers of suitable size for the system or to employ some other means. With a multiplicity of large breakers as would be required to handle the system's short circuit, the space taken up and also the cost becomes extremely high. Other means are consequently generally more economical.

The boric acid fuse* is being extensively used in connection with such installations and permits in most cases the use of standard breakers as used in control equipment and extends their capacity up to that of the fuses. The 7500 volt, 200 ampere fuse has an interrupting capacity of 25,000 amperes and the 400 ampere fuse an interrupting capacity of 35,000 amperes. A short circuit of 10,000 amperes or over is cleared by these fuses in approximately 1 cycle so that the breaker need only have capacity to carry this current until relieved by the fuse. Such fuses may be readily combined in control assemblies with circuit breakers and provide both for short circuit protection and disconnect service.

(*) Additional information regarding the operation, construction and application of these fuses, especially in connection with high voltage motors, is covered in an article published in *"Electrical Journal,"* May, 1937, entitled "Protecting High Voltage Motors with Fuses."

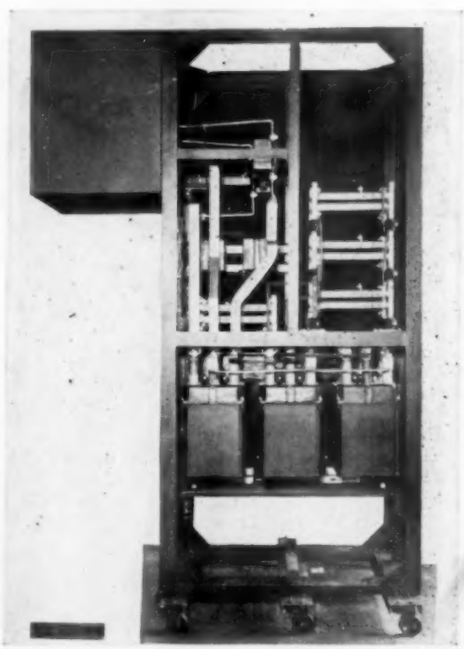

FIG. 7—Rear view of 3 breakers for forward, reverse and dynamic braking service.

High Flex Cord in Bus and Truck Tires

By K. D. Smith
Technical Superintendent, Tire Division, B. F. Goodrich Co.

A LARGE part of the rubber industry's development work in recent years, especially on truck and bus tires, has been along the lines of trying to use materials, both cord and compound, which would resist the high temperatures that are developed in these tires in high speed service. In this connection synthetic material (rayon) in place of cotton cords has been introduced within the last few months, the claims for this material being that it would resist the heat much better than cotton.

It has been our thinking for some time that methods could be applied to the construction of these tires to reduce the amount of heat developed in the tires when run at high speed. Naturally, this development work has centered around the construction and make-up of the cord itself.

Variation in Cord Elongation

The present cord, as it comes from the fabric mill, has an elongation of anywhere from 15 per cent to 22 per cent at 10 pound load. We have realized for some time that during the process of building the tires a large portion of this elongation is lost and then, further, during the life of the tire additional elongation disappears, so that in a used tire there is a considerable amount of variation in the elongation of the cord. Tires built with this ordinary cord increase in dimensions considerably during service, and this increase in size puts unequal strains on different portions of the body of the tire so that weaknesses develop that cause early failure.

We have now developed an entirely new type of cord. During the process of building the tires and during the service life of the tire this cord behaves in an entirely different manner from the cord heretofore known as high stretch cord. In the making of this new cord (known as Hi-Flex) we remove this so-called artificial stretch before the cord is built into the tire. This process of handling cord results in a cord of smaller gauge—not because of less cotton but because it is more compact. After it is stretched, it returns to its original position. There is no slippage of fibers against each other, which in the ordinary cord resulted in high stretch.

Because of the fact that this new type of cord is more compact, it enables us to build a tire with the same amount of strength yet with less overall thickness, and this in itself means a decrease in the amount of heat developed. This high density cord has improved the elastic properties, and it will withstand the high working stresses of tires much better than ordinary cords. The greater flex resistance of this high density cord allows structural improvements in tires which increase the flexibility. This new cord has much greater flex resistance and therefore almost entirely eliminates shoulder breaks and sidewall breaks that result from excessive flexing.

The Hi-Flex tire cord being covered with rubber in this operation at the Martha Mills is designed to resist high temperatures.

The high recovery of high density cord maintains the physical construction of the tire. The tendency to grow or increase in dimensions is very much less with this type of cord than with ordinary cord. Tires constructed with this new type of cord were analyzed after they had run many thousands of miles in high speed service, and it was found that practically all of the original properties were retained, whereas ordinary cord loses its elongation very rapidly during service—particularly on the inside plies of large heavy duty high speed tires.

Advantages of Hi-Flex Cord

Hi-Flex cord is particularly well adapted to truck tires, although we find it has considerable advantage for different reasons in passenger tires. The process by which this high density cord is produced must be kept secret so far as Goodrich is concerned, although the method and the resultant material are thoroughly covered by patents held exclusively by the company.

We feel that cord produced in this manner is probably the most revolutionary development we have had in the tire industry for the last ten years. The results obtained in the improvement in tire service are far

greater than we anticipated when starting this development, but we are convinced now, as a result of road tests as well as indoor tests and laboratory tests on the cord itself, that with the use of this new type of cord we can produce tires that are far better than any tires that have ever been produced, particularly for high speed service.

What about this cord in passenger tires? The answer is that we do use this type of cord in passenger car tires, but not exactly for the same reasons as we have applied to the use of this material in the truck and bus sizes. While we have tremendous heat to contend with at high speeds, it is of course a different problem with the truck and bus tires, because of their greater thickness—resulting from many more plies.

Advantage in Passenger Tires

The chief advantage in the new type of cord in passenger tires is obtained by the fact that the cord being more compact and smaller in cross section, we are able to provide more insulation between one cord and another; yet we maintain the same number of cords per inch. This, of course, determines the strength of the body of the tire. With regular cord, if we were to increase the space between each cord, it would be necessary to use a smaller number of cords, and this would decrease the total body strength too much. With the new type of cord we are able to maintain our total body strength and at the same time have more space between the cords.

There is the further advantage in using this type of cord in that we have less growth in the tire; hence, less tendency to pull away from the reinforcing strips around the beads, which with ordinary type of cord causes a thinning out at this point that very often under severe conditions leads to a break at the top of the rim flange. Also, due to the fact that the Hi-Flex cord has much greater resistance against flex breaking, there is less likelihood of broken cords caused by under-inflation and over-loading.

New Use for Old Tires

ANOTHER new use for completely worn-out tires has recently come to light. They are turned into miners' seat, elbow and knee protectors used by thousands of native kaffirs who work in the narrow stopes of the Witwatersrand gold mines in South Africa, according to Samuel H. Day, American Commercial Attaché, in a report to the Department of Commerce. Tires of all sizes are suitable for these protectors, although discarded bus and truck tires are preferred.

It has been found impractical to use rubber-impregnated new fabrics in the production of these miners' protector pads partly on account of cost but principally because flat material does not conform readily to the shape of the body. The curved tire is said to be ideal for this purpose and can be made cheaply enough to meet the low purchasing power of the native underground workers. In the process of making these pads, the rubber is first stripped off the tire and the carcass split down to 2-ply layers. Although the local supply of used tires was at first adequate, the continued demand for these special protector pads, plus the fact that retreading activities are spreading in South Africa, has resulted in a lack of available supply. Reclaimers may be interested in this market from the standpoint of exporting bare carcasses to South Africa.

Latex Stratosphere Balloons

ALTHOUGH brief descriptions of the stratosphere balloons have appeared from time to time the extent of their use and their rapid development can first be appreciated by an article by Robert J. Gray of the Dewey and Almy Chemical Company, Cambridge, Mass., which appears in the October-November issue of *Monsanto Current Events*. Stratosphere balloons are made by the Kaysam process which makes possible the casting of a very thin film that can expand to almost fabulous diameters.

Because stratosphere balloons are extremely thin they are also very light in weight and the lowered pressure of the atmosphere as they rise causes the small quantities of hydrogen with which they are inflated to expand with the decreasing pressure of the atmosphere, carrying them upward at a practically constant rate of speed. Balloons with an initial diameter of 4 feet can expand to 15 or 20 feet before they break in the highly rarefied atmosphere of the stratosphere, according to Mr. Gray.

Principal Use of the Balloons

At the present time the principal use of the stratosphere balloon is in weather forecasting. The development of a meteorograph, which not only measures temperature, humidity and pressure, but also acts as a miniature broadcasting station, and which is attached to the balloons, has facilitated the use of these balloons. Once the balloons are sent aloft, the meteorograph reports instrument readings to the ground station by a system of clicks at varying intervals. These radio signals are in turn converted into a chart showing temperature and humidity conditions at the different levels as the balloon ascends. Heretofore, airplanes had to be sent aloft to obtain these readings. The advantages and economies of the balloons are obvious.

Many new uses, however, are being found for the stratosphere balloons. They are being used in a study of the causes of hurricanes and data are being gathered on upper-air conditions that precede storms. They are being sent aloft with special instruments to gain more information on cosmic ray. Polar expeditions are using them to determine weather conditions in the stratosphere above the North Pole. In the field of aerial photography still another use has been uncovered. Equipped with special cameras they are being used to take bird's-eye views of streams, bridge sites, etc. Their use in connection with stratosphere flights by Professor Picard has already received wide attention. A method of using flares attached to these balloons as a means of studying air currents at night is now being worked out.

Special Launching Method Devised

One of the problems that Dewey and Almy had to solve was how to launch the large meteorological balloons in a high wind. This was accomplished by the development of a special launching tunnel on the idea of a wind-exploded cannon. On windy days the balloons are carried into the tunnel uninflated and are then filled with a small amount of hydrogen to give them "life." The cords attaching the weather instruments are made fast and the tunnel is turned with its mouth facing out of the wind. The doors at each end are simultaneously opened and the sudden rush of wind through the tunnel serves as "gunpowder" with the result that the balloons are lifted high in the air before a sudden gust can dash them against any trees or ledges.

Evaluation of Rubber and Rubber-Like Compositions as Vibration Absorbers

By Felix L. Yerzley,
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THE increased amount of information required for structural applications of rubber and neoprene reveals unmistakably the inability of available test equipment to provide the information most needed by design engineers. On the basis of present tests, it is extremely difficult for an engineer to select the material best suited to a given use. He may write his specifications for rubber-like materials much as he would write specifications for steel, and often fails to recognize that the essential differences between the mechanical characteristics of rubber, rubber-like materials, and steel require different methods of evaluation. Rubber goods manufacturers, on the other hand, may not always appreciate the problems of mechanical engineers. The attainment of a common basis of test is important, therefore, and the test equipment described in this paper is offered as a step in that direction. The present paper is limited to factors involved in the evaluation of rubber and rubber-like compositions as vibration absorbers.

It is necessary at the outset to have a clear understanding of the field of application for rubber mountings. Metallic springs have been used for mountings for many years and satisfactorily meet many needs. They possess resilience to a remarkable extent, which under certain conditions is highly desirable, but where oscillation must be absorbed they usually require a shock absorber of one of the conventional types as auxiliary apparatus. The peculiar virtue of rubber or a rubber-like composition as a mounting material is that it has within itself the ability to damp out vibration. This damping implies the conversion of mechanical energy into heat.

We shall assume that the characteristics of a vibrating machine are thoroughly known and that this machine is to be mounted on a framework in such a way that excessive shocks will not be transmitted to the frame, and oscillations of high amplitude will be prevented. To meet the first condition it is necessary to provide a composition of the proper modulus, which will extend the time element in shock sufficiently to reduce considerably the force transmitted.

To meet the second condition it is necessary to consider the critical speeds of the complete assembly. We will assume that by selecting material with a sufficiently low modulus, the critical speeds will be kept low. This simplifies the problem by reducing the required energy absorption to oscillations at low frequencies, a condition naturally favorable to the

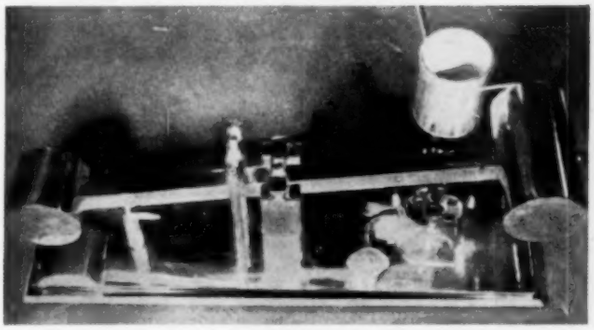

Figure 1.

durability of the vibration-damping composition. At critical frequencies every impulse serves to increase the amplitude of oscillation of the machine; hence, it is at critical frequencies that the vibration damper must absorb the maximum amount of energy.

No composition for mechanical mountings will be satisfactory unless throughout its life it maintains its original elastic characteristics and form to a reasonable degree. For example, it is desirable that the characteristics of a vibration damper remain reasonably fixed over a wide range of temperatures. However, the art of compounding does not yet appear to have reached the goal where no changes in modulus and damping characteristics occur with changes in temperature. Since complete elimination of temperature dependence is not possible, a suitable tolerance must be allowed in the original plans.

Tolerance must also be allowed for change in form. Obviously, a thermoplastic material is not suitable; yet all rubber and rubber-like materials will show a certain amount of permanent deformation under the influence of the dead load. Thus, some slight drift must be expected and in almost all instances can be allowed for in design.

Other factors affecting permanence are principally resistance to oxidation, fatigue, excessive heat build-up, and deterioration in oils or active chemicals. In considering mechanical fatigue it is obvious that a stock cannot be used beyond a certain allowable stress. This limits not only the original applied load, but also involves the extent of motion in vibration. The intensity of the load is related to the question of permanent set, structural disintegration upon repeated working, and extent of heat build-up. The temperature rise during the use of a vibration damper must not be excessive. The limitations of temperature rise are dictated by the resistance of the stock to progressive

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cure and to deterioration when exposed to air, ozone, and solvents. Oil resistance can be eliminated as a factor by special features of design, which shield the stock from contact with lubricants, but the necessity of shielding from the lubricants may so restrict the design as to limit its suitability. For that reason there are many instances requiring a stock which is itself inherently oil-resistant.

Mechanical tests must reveal several characteristics. It is necessary to know the static stress-compression characteristics of a proposed vibration absorber. This characteristic determines the allowable load per unit area and is a primary factor in the appearance of drift under a dead load over long periods of time. The test should also reveal the dynamic modulus of the stock as a quality definitely distinguished from static modulus. It is true that the static and dynamic moduli will be very nearly the same if the stock is highly resilient, but high hysteresis causes a difference to appear between the two. Since the dynamic modulus should be considered in properly relating the design of a motor mounting to the frequency characteristics of the motor, the necessity of properly evaluating it should not be overlooked.

Damping Feature of the Mounting

The rate of absorption of energy is important. This is the damping feature of the mounting, and since it is a significant factor in choosing rubber, for example, in preference to steel springs, a ready means for its evaluation is extremely important.

Another factor very important in design is the knowledge of the deflections which will result from the application of a given shock load. Although it is possible to calculate the permissible dead load from the static characteristics and to limit the drift by keeping this below certain limits, the question of allowable deformation must be dealt with as a dynamic consideration. Here again hysteresis characteristics and static modulus determine the dynamic hardness. The term "dynamic hardness" is here used to represent the dynamic relationship between impact load and deflection. Thus, a stock with high hysteresis and a given static modulus shows a greater dynamic hardness than a stock with the same static modulus and low hysteresis.

Table I. Compounds Tested

	No. 1	No. 2	No. 3
Smoked sheets	100.	100.	100.
Zinc oxide	5.	5.	5.
Channel black	40.	40.	...
Soft carbon black[a]	...	20.	...
Stearic acid	1.5	1.5	1.5
Pine tar	6.	6.	...
"D" Phenyl-β-naphthylamine	1.	1.	1.
Zenite B[b]	0.8	0.8	0.8
Sulfur	3.	3.	3.
	No. 4	**No. 5**	**No. 6**
Neoprene type E	100.	100.	100.
Extra light calcined magnesia	10.	10.	10.
Channel black	...	25.	50.
FF rosin	5.	5.	5.
"D" Phenyl-β-naphthylamine	2.	2.	2.
Sulfur	1.	1.	1.
Zinc oxide	5.	5.	5.

Press cure:
Compounds 1 and 2, 40 minutes at 40 pounds' steam pressure (141.5° C.)
Compound 3, 25 minutes at 40 pounds' steam pressure (141.5° C.)
Compounds 4 to 6, 40 minutes at 60 pounds' steam pressure (153° C.)

[a] P. 33 was used.
[b] 90 per cent zinc salt of mercaptobenzothiazole–10 per cent diorthotolylguanidine.

Table II. Results of Tests

Compound	Dynamic Hardness	Static Hardness	Amplitude of Sixth Rebound	Resilience, %	Shore Durometer Hardness
3	138	87	49	56	38
4	128	86	11	13	41
1	119	84	2	2	52
2	108	77	2	2	57
5	98	69	3	5	56
6	71	53	1	2	74

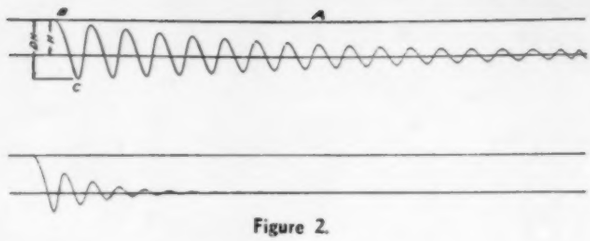


Figure 2.

The rapid measure of drift occurring in the first minute of loading may be an indication of the drift to be expected over a more extended period of time, but this does not necessarily follow. However, drift over one period of time is of interest and such data can at times be an indication of trends which are undesirable. It is necessary to distinguish clearly between the sluggish action which characterizes a high hysteresis stock and the definite plastic flow which is characteristic of undercured rubber or rubber-like materials and thermal plastic materials.

Apparatus

The apparatus which is here described combines measurements hitherto not accessible from simple apparatus, and is a means of evaluating rubber and rubber-like compositions both statically and dynamically. Figure 1 illustrates the construction. The machine consists of an unbalanced lever with a 20-pound weight on one end and a 10-pound weight on the other, pivoted on a knife edge at the mid-point of its length. The test piece is a small rubber cylinder 0.75 inch in diameter and 0.5 inch high. During the test this is compressed between a stationary horizontal surface and the upper surface of the unbalanced lever in such a position that the compression of the test specimen resists the tendency of the 20-pound weight to fall. Thus, if the heavy end of the lever is lifted and then released, the test specimen is subjected to a shock load and is distorted beyond the static equilibrium position. In this way an oscillating system is established and the 20-pound weight rises and falls while the test specimen goes through various degrees of compression. Each oscillation is smaller than the previous one, owing to the internal friction or mechanical hysteresis of the test piece, and eventually the lever comes to rest. A hook shown in the left foreground of Figure 1 secures the weight initially in a definite position and is adjustable in height. By releasing the hook, the weight falls from a predetermined height, and the energy input is determined by multiplying the height through which the 20-pound weight falls by the number of pounds of unbalanced weight.

A pen mounted on the heavy end of the lever traces a record on a revolving drum which is driven by a synchronous motor. Thus, the amplitude and frequency of the oscillations can be permanently preserved for analysis.

Figure 2 is an actual test result obtained from a fairly resilient composition. Line *A* is the zero reference made by lowering the pen to the surface of the drum and allowing the drum to rotate through one revolution with the pen in a stationary position. On the second revolution the heavy end of the lever is released at point *B*. Point *C* represents maximum

compression of the pellet, and the distance from *C* to the line *A* is a measure of dynamic hardness. The line *BC* is a graphic indication of the response of the test specimen to an impact load. Subsequent oscillations indicate the rate at which the impact is absorbed. If successive amplitudes rapidly diminish, the composition is one which will not readily support vibration at critical frequencies. The rapidity with which the oscillation record crosses the time axis is an indication of frequency and is related to the value of the dynamic modulus under the given test conditions. Figure 2 is an actual test result obtained from a composition with much lower resilience.

If a stock has a tendency to drift under a dead load this can readily be detected by allowing the drum to rotate through two or three revolutions when the lever is resting in its static equilibrium position. Qualitative information of this sort may often be useful.

Applicability

To illustrate the applicability of the test to the evaluations of a variety of compounds, static and dynamic characteristics of six rubber and neoprene compositions (Table 1) are given. Shore durometer hardness is also given to provide a rough basis of comparison with present test methods (Table 2).

Dynamic hardness, static hardness and the amplitude of the sixth rebound are given in arbitrary units of hundredths of an inch as measured on the autographic record. The ratio of the amplitude of the sixth rebound to the original elevation of the 20-pound weight is arbitrarily taken as the figure for the resilience of the stock.

There is no reliable correlation between shore durometer hardness and dynamic hardness as evaluated by this test. The durometer makes a surface test, whereas the apparatus described herein makes a volume test, which is obviously in closer agreement with the loading to which a motor mounting is subjected.

Compounds 3 and 4 have approximately the same static hardness. Compound 4, however, shows noticeably greater hysteresis since the resilience is lower. This factor contributes to the lower measured dynamic hardness of 128 as compared with 138 for compound 3. Compounds 1 and 2 are rubber stocks having high hysteresis and are presented to show the differences in hardness revealed by this test both dynamically and statically. Compounds 5 and 6 are neoprene stocks.

The machine can be designed for use either in an oven or a refrigerator by mounting the recording mechanism outside of the box and by providing a remote control of the weight-release mechanism. By such an arrangement tests of a given test piece can be made over a wide range of temperatures. If a stock is reasonably oil-resistant, its characteristics before and after an immersion test can be compared. The machine can also be used as a valuable auxiliary to one of the existing fatigue machines, to evaluate a test piece periodically throughout the duration of a life test.

Summary

The equipment is simple and foolproof. It provides an autographic record in a few seconds, from which can be evaluated dynamic hardness, dynamic modulus, internal friction, static hardness, and drift.

It can be used to test rubber and rubber-like compositions over a very wide range of temperatures—for example, from −40° to 150° C.—for testing compositions which have been exposed to solvents or gases, and in conjunction with a fatigue machine for evaluation at various stages in a life flexing test.

Non-Corroding Rubber Insulation

ONE of the principal difficulties experienced in making satisfactory soldered connections to rubber-insulated telephone cords has been the presence of corrosion on the tinsel conductors caused by the sulfur in the rubber compound. Attempts were made to develop solderless cord tips for rubber-insulated cords, similar to those in use on textile-insulated cords, but too many difficulties presented themselves. It therefore seemed desirable to the Bell Telephone Laboratories to develop a non-corroding rubber insulation if possible.

By employing certain accelerators or combinations of accelerators in considerably larger quantities than is customary, it is possible to vulcanize rubber to the condition of best physical properties with less than 0.5% of sulfur. With certain accelerators no sulfur need be added, that necessary for vulcanization being made available by decomposition of the accelerator which contains sulfur in its molecule. By employing larger quantities of a suitable accelerator or accelerator combinations and a small amount of sulfur, vulcanization takes place rapidly and practically all of the sulfur combines with the rubber. The short time of cure and the absence of free sulfur in the rubber both contribute to greatly decreased tendency for corrosion of the tinsel.

On the basis of these facts, Bell Telephone engineers, in cooperation with the Apparatus Development Department, undertook development work which finally resulted in a compound that, when properly processed, proved a suitable insulation for tinsel cords and allowed satisfactory connection to be made with solderless cord tips. The new insulation was found to reduce corrosion to a negligible amount and also to have superior mechanical and aging characteristics to those of the former insulation.

Because of the greater resistance to wear of the new insulation it was suggested that the textile braids, used as mechanical protection over each conductor of the earlier waterproof cords, might be eliminated. These braids, however, carried color tracers which served to distinguish one conductor from another so that if they were eliminated some other means of conductor identification would have to be provided. This was accomplished by incorporating colors into the white base compounds and thus the traditional color scheme was preserved by preparing red, green, yellow, black and white insulations.

The application of continuous vulcanization to the new cords has reduced their manufacturing cost and this, combined with their improved characteristics, has made it possible to use non-corroding rubber-insulated cords in place of the textile cords that had been used previously. Development of these cords is more fully described by J. H. Ingmanson in the November, 1937, issue of the *Bell Laboratories Record*.

"Rubber Lung" Development

FOR many years the "iron lung," the name applied to the device which enables those stricken with infantile paralysis to continue breathing after the disease has paralyzed the muscles of the chest and abdomen by mechanically expanding and contracting the

The "rubber lung," shown above on a model, lifts the patient's chest walls by alternating vacuum and slight pressure.

lungs through the medium of a rhythmical application of a partial vacuum to the outside of the body, has succeeded in keeping paralysis victims alive for months, and in some cases, for years. Widespread publicity of these "iron lungs" was given in the case of Fred Snite, Jr., who was stricken with infantile paralysis in China while on a world tour almost two years ago and who has since been continually imprisoned in one of these devices. Recently, Mr. Snite was brought back to America in his "iron lung" and is currently living at Miami, Florida.

Shortly after Mr. Snite's return to America the General Tire and Rubber Company of Akron, Ohio, was interested in the possibility of constructing a new type of "lung," one using sponge rubber that might possibly allow the patient's arms and legs to be as free as the head. (In the "iron lung" only the patient's head protudes from the device, the remainder of the body, arms and legs being completely encased). As a result of engineering achievement between Herman Kraft, General Tire engineer, and Dennis R. Scanlan, a respiratory expert, plus valued assistance from Dr. Newton Meade, attending physician to Mr. Snite, a "rubber lung" has been produced. The important factor in this new "lung" is that instead of enclosing the entire body of the patient in the respirator it encloses only the patient's thorax and abdomen, leaving all four limbs and the perineal region free for nursing care.

The "rubber lung," which has been termed the Stille-Scanlan Respirator, named for Mr. Scanlan's surgical instrument firm, consists of a cuirass of aluminum which is made to fit closely to the upper part of the patient's body by rubber fittings which taper in hardness from hard rubber down to the softest sponge rubber which lies directly against the patient's body and which helps to form the partial vacuum which lifts and lowers the helpless chest muscles of the victim. Only the thorax and abdomen are covered by the cuirass.

When used on a specially-built hospital bed, the new "rubber lung" enables the position of the body of the patient to be changed almost at will. It has been found that three different sizes of the respirator will fit every type and size of patient from 30 pounds to 270 pounds in weight. At this writing the "rubber lung" has gone through preliminary tests and needs a few additional adjustments before it may be used on Mr. Snite. If successful in this unfortunate case its adoption will undoubtedly be international.

Double-Duty Caulking Compound

MADE of rubber, linseed oil and asbestos, a newly developed caulking compound that gives double duty to the user (it may be applied either with a gun or tool) has been introduced by the Tamms Silica Co., 228 North La Salle St., Chicago, Ill. The company recommends gun application for narrow openings around doors, windows, etc., while a putty knife or similar tool is suggested for larger openings, such as holes, chimney bases, etc. Because of its rubber ingredient, the new compound provides for expansion and contraction difficulties. The linseed oil provides a fine protecting film which wards off moisture, giving the product longer wear. The compound sets rapidly and can be painted like wood or any other material twenty-four hours after application. It provides an elastic seal, expands and contracts as required, and does not crack or check, according to its manufacturers.

Your RUBBER RED BOOK

This column will appear from time to time and will contain changes or corrections which have come to our attention and which should be made in the 1937 Rubber Red Book Directory we recently published. By transferring the changes appearing in this column to their individual copies, holders of the Directory will have available correct data at all times.

Pages 11 *and* 71: Acme Rubber Co., Massillon, Ohio. Delete. Company is being liquidated.

Pages 18 *and* 63: Boston Combining Co. New address is 112 Norfolk Ave., Boston, Mass.

Page 29: General Asbestos and Rubber (Division of Raybestos-Manhattan, Inc.). Address should be North Charleston, South Carolina.

Page 35: Hygienic Dental Rubber Co., Akron, Ohio. This company is not an affiliate of the Seiberling Latex Products Co. Delete this from listing. It is an independent company manufacturing dental rubber, dental dam, and dental foot cushions.

Page 44: Olympic Rubber Co. Change listing to read as follows: Est. 1935; Employs 10. Co-partnership—Fred R. Spraul and Roy R. Renouf. *Products*: Molded and Mechanical Goods.

Page 52: Sierra Rubber Co., Los Angeles. Change name of co-partner from C. H. Y. Reith to C. H. Vonder Reith.

Page 163: Industrial Equipment Co. New address is 207 Murray St., Newark, N. J.

Page 163: Marquette Mechanical Engineering Co., Cincinnati, Ohio. Delete. Moved, left no forwarding address.

Page 232: K. Keller, New York City. Delete. Mr. Keller has withdrawn from the crude rubber business.

Production and Use of Rubber Printing Plates

A Description of the Equipment Required to Make the Plates Combined with Their Use in the Graphic Arts

By J. E. Frey
Research Department, The Standard Register Co.

MUCH has been written and published about rubber and synthetic rubber printing plates. Much more is needed to awaken the letter press industry to a point where it will carefully study and analyze the many new types of plates that are now appearing on the market. The cry of the letter press industry has been "give us something new," but when this was accomplished the sceptics were many in number. Why? There were none experienced enough to teach the uninitiated. There has been more experimental work in rubber and synthetic rubber plates, however, in the past six months than there has been in the past ten years, with the result that the perfection of printing using these plates lies just around the corner.

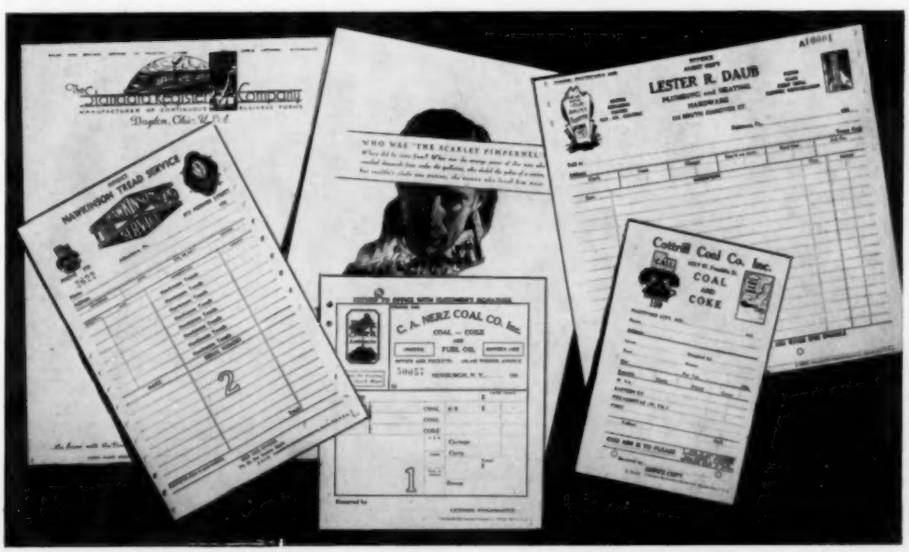
It is not the intention of the author to write a long treatise on the subject of rubber and synthetic rubber printing plates, since almost all printers have some information available by this time. It is a foregone conclusion that once the letter press printers learn more about these plates, and experiment with them, they will be extensively used and widely adopted. It is not a difficult matter even today to get rubber and synthetic rubber plates as nearly every large city has one or more concerns producing them.

To produce rubber or synthetic rubber plates a good steam-controlled press with hydraulic pressure and a water pressure pump, equipped with either automatic or hand control, is required. Some prefer an electric rubber plate making machine. Both types of equipment have their advantages, and choice is left with the plate maker who is guided by the type of plate he prefers to make. Several electrotype foundries are now making rubber plates, while many rubber stamp makers, with equipment already available, are also producing fine rubber and synthetic rubber plates. The required equipment is not costly and when once understood will function properly. The author has seen 133-line rubber and synthetic rubber plates, made from copper etched plates, print as fine as offset.

In making rubber plates the operator must bear in mind one all-important fact: you cannot produce a better plate than the material you have to work with, whether it is a type form or an engraving. It is therefore a requisite that the original object be as perfect as possible. The type or cut form should have all exposed parts at the exact same height, *i.e.*, they should all be .918-inch in height. The bearers, which should be 1-inch wide and .918-inch high, should be of true steel and smoothly finished. In locking up the form high leads and slugs should be used. No low spacing material should be used in any type matter.

When type is used as the basis for rubber or synthetic rubber plates, the type should be placed in a chase and slugs ¼-inch high placed next to the type with the true steel bearers next to the slugs. A good strong chase should be used to lock up the form. One reason that many experimenters have failed to produce a good rubber printing plate is due to the fact that they

EDITOR'S NOTE: By the term "synthetic rubber" throughout the text of this article the author refers to the chloroprene (neoprene) and polysulfide (Thiokol) types of rubbers.



Specimens of printing, including letterheads, order blanks, invoices and promotional material, all of which were printed from rubber plates, some of which were prepared from zinc etchings and some directly from type forms. Little or no make-ready was required on any of these specimens.

do not have the proper equipment to lock up the form as required and unless this first step is successfully accomplished the chances for a perfect plate are few. Many printers suffer loss of time and money by not getting the type and cuts all .918-inch high throughout. The slightest variation may result in a poorly produced plate.

There are several kinds of matrix-making material on the market and caution must be exercised to get the right kind. Shrinkage is the essential property to consider. Shrinkage can be controlled and we have seen color plates, made from rubber and synthetic rubber, register to a hairline in the printing operation. The author knows of but two manufacturers who produce matrix making material really suitable for this work.

Method for Making Matrices

Steam or heat pressures vary in mat making. There are many methods, entailing intricate instructions, for the making of a matrix or mold for rubber plates. It should be emphasized that making the matrix or mold for these plates is fully one-half the plate makers' problem. The following method has been found to be quite satisfactory:

First, have the type or cut form securely locked up in the chase, after ascertaining that all material is type high (.918-inch). All bearers surrounding the form, as previously explained, should be no less than 1-inch wide and .918-inch high. A little recess between the bearers and the type should be allowed so as to hold the material in its original form. This can be accomplished by ¼-inch slugs already referred to.

Bearers to be used for making the matrix on the press aside from the form should be .918-inch plus the thickness of the mat board and tin or metal shield. This means that the type must be .918-inch while the mat may be .020-inch and the tin or metal cover .015-inch. Thus you have a .953-inch overall.

The type form is placed on the steam press and under steam pressure of 60 pounds for a few minutes. While this is being done, a releasing wash is brushed over the type form after it becomes hot. Prepare a sheet of matrix board cut a little wider than the form and bearers, wrap the board in a soft cloth and let it lie on the hot bed of the press to get thoroughly warm. It should be permitted to remain until it becomes as soft and as pliable as putty. When this point is reached, lay it squarely over the type form and push the form back into the press. Be sure there is a metal sheet over the back of the matrix so that it will not stick to the bed of the press when the press is released.

After pushing the form back into the press, bring the press up to almost closing and pump water pressure up from 40 to 60 tons on the gauge. Let it stand for a few seconds to get set, and then pump the press tight to bearers. It takes 10 minutes to finish a matrix. It is a good idea to have a time-bell arrangement so that running time will be uniform on all matrices. When the press is released the mat should be pried off and cleaned up for plate making purposes by using an emery cloth or a file to take off all the rough edges. The form should then be removed from the press and the mat cleaned with a stiff brush. You are now ready to make the plate.

In making the plate first lay the matrix on the press bed and be sure to have the bearers the exact height you wish to make the plate. For example, for a plate .125-inch thick use a frame of any kind or bearers of .127-inch. This depends on the height of the bearers required to squeeze the rubber to the .125-inch thickness. Then place the rubber or powder inside of this frame. You may need a few thousandths of an inch more in some cases, depending on the thickness of the rubber or powder. Place the tin or metal sheet over the rubber or powder, place it in the hydraulic press (or any press you use), give it 40 pounds of steam, and then pump the water pressure up to 40 or 50 tons on the gauge, letting the matrix warm a few seconds before giving it the full 50 ton pressure. Curing time is 10 minutes.

This method of making matrices and plates is based on a hydraulic press of 220-ton capacity, with water pump, air pressure, and generated steam and distillation apparatus. Naturally, the method outlined does not apply to the electric mat making machine process to which totally different instructions apply.

Rubber and synthetic rubber can be mounted on practically any kind of material—wood, lead, steel, copper, brass, etc. Different adhesives apply in the case of each material. When rubber plates are intended for use on job or cylinder presses, they may be mounted on patent or special bases. Any kind of form that is now in use can be fitted with rubber plates. When intended for rotary presses, shells can be cut down from electrotypes, stereotypes, or can be bent from aluminum or steel.

If stereotypes or electrotypes are used, both of which are .250-inch thick, they should be cut down to .125-inch on a lathe and the rubber plate should be made to .125-inch thickness. Thus, when mounted, you have a .250-inch plate. Where adhesive tape is used as a bonding agent, allowance should be made for its thickness. Care must be taken to have all material even and measuring to the correct .918-inch height when mounting on wood, metal or grooved blocks, or whatever the requirement is for smaller size shells for rotary press work.

When placing rubber or synthetic rubber plates on the press, care must be exercised to have the rollers just kiss the plates. Impression must be a kiss as well. If the tympan is set to the right height of the bearers on a cylinder press or set evenly on a flat bed press, there should be no make-ready. On either of these two types of presses it is advisable to have a set of type high bearers run a little longer than the form so as to keep the rollers from striking the ends of the plates when passing over them. The cylinder bearers should ride evenly on a rotary press. No extra bearers are needed.

Heavy Inks Should Be Avoided

Tympans should be hard and well packed so as to give a smooth impression. A sheet of paper makes a big difference. The rollers should not be too hard, a roller without some resilience wearing out plates too quickly. It is not necessary to underlay a rubber plate. If the mounting should be uneven remember it will take very little make-ready on the tympan. If the plate is uneven due to the original pattern, use tissue paper to make ready.

Heavy inks should not be used for printing rubber plates. Hard bond inks are neither advisable nor practical. Because a soft ink with a good sheen will run and print black, ink of practically any kind in stock can be used if not too heavy. A heavy ink will tack and catch paper dust on the plates, thus ruining them. Oil, heat or acids will not harm the plates. It is advisable to wash the plates off at night or if the press is left standing for any length of time. In washing the plates use just enough naphtha or alcohol to remove the ink, and then wipe the plate dry with a rag.

Additional specimens of printed material from rubber and "synthetic rubber" plates. When properly made, these plates (which are prepared in a few minutes) may be used for long press runs, as many as two million impressions having been recorded.

Aniline inks and silver bronze inks will run fine on rubber plates. Cover inks should not be used because they are too heavy and are especially designed for metal plates that require a heavy body ink than can be forced into rough stock. Since rubber plates require no pressure of any kind, light or soft ink will set on the paper without pressure. An even film of ink will conform to the paper and splendid results have been secured in color work. Rubber can be used for tint blocks and tint plates for all uses. In putting reducers in inks used with rubber plates be sure to have vegetable and not too much mineral substances.

Formula for Reducing Inks

If it is absolutely necessary to reduce an ink used with rubber or synthetic rubber printing plates use 10 drops of kerosene or cobalt drier to a pound of ink. Do not load inks. It is also advisable to let your ink supplier take care of the proper tack, etc. A job printed from rubber plates will dry in much less time than one from metal plates. Colors can be run over one another in one-fourth the time of drying on metal plates. Rubber plates will not offset if ink is put on properly. A "non-pick" ink should be used in the case of enameled or highly coated paper. Rubber plates will print much like offset since there is no impression to show on back. The smooth laying on of ink also gives the finished job an offset appearance.

There are many advantages and economies to be gained by the use of rubber and synthetic rubber printing plates. For instance, such plates use less ink per job as the ink lays evenly and requires no pressure. Rubber does not overflow in plate making and plate after plate may be reproduced uniformly, with all details exact. If properly made, rubber plates may be used for long runs, even though they require but a few minutes to make.

The matrices used to make the plates and the plates themselves may be saved. Plates can be taken from their mountings and placed in envelopes for filing, and should a change at some future date be required lines can be stripped off and easily replaced. They should be filed in a cool, dry place at all times, however. There is less danger of over-printing when rubber or synthetic rubber plates are used because the plates do not dig into the paper. Machinery maintenance economy is also effected because the plates are not as "rough" on printing presses as are other types of plates.

Still other advantages are these: on some papers the front and back may be printed at the same time; rubber plates are less costly than metal plates and are more durable; they require no special material or furniture for locking up; any kind of paper can be used with them. The number of impressions secured with rubber or synthetic rubber plates generally depends on the operator and the condition of the printing press, as well as on the care expended in its production. The author has heard of one case where two million impressions were secured on one run with rubber plates.

Different types of synthetic rubbers are available, each having some special quality recommending it for a certain type of printing. It is advisable to secure rubber plates from regular plate makers rather than to install the needed equipment to make them, unless the user is in constant need of special plates.

Entropy of Isoprene

PART of the research program now being conducted by the National Bureau of Standards on the chemical thermodynamics of rubber and related substances relate to the determination of the heat capacity and calculations of the entropy of isoprene. During this investigation the heat capacity was measured at temperatures from 25° C. down to —253° C. (20° K), using an adiabatic calorimeter of the vacuum type. In this temperature range isoprene exists in two forms: (1) crystalline below the freezing point at —146.8° C., and (2) liquid above this temperature.

The heat capacity curve and the melting point are very different from those of the rubber hydrocarbon. The heat of fusion of isoprene at its melting point is 4,830±15 joules per mole. From these data on the heat capacity and the heat of fusion, the entropy of isoprene was calculated to be 229.3±1.0 joules per mole per degree at 25° C. These results are reported by Norman Bekkedahl and Lawrence A. Wood in the November, 1937, issue of the *Journal of Research*. Work now in progress on an accurate determination of the heat of combustion of isoprene is required for a calculation of the free energy.

Oppanol B—New Thermoplastic Material

A NEW highly elastic, thermoplastic material, said to have exceptionally good physical and electrical properties, known as Oppanol B, has been introduced to the European market. Described as being a "synthetic rubber type compound," the new material has been made available in two grades, Oppanol B 100 and Oppanol B 200, the molecular weight of the first being 100,000 and the second 200,000. It can be extruded at high speed on to wires at a temperature of approximately 225° C. and maintains its elasticity within a temperature range of —50° C. to over 100° C.

Oppanol B can be incorporated with rubber on steam-heated rolls in the proportion of 25% or more to that of rubber. Rolling temperature should be about 180° C. The addition of wax or montan resin to the Oppanol will facilitate working and give better elasticity, according to report. Tests have indicated that the aging properties and low loss figures of rubber are improved by the addition of the new compound. Extrusion temperatures of the mix will be correspondingly decreased according to the amount of rubber that is used in the mixture.

Oppanol B is described as being non-hygroscopic, resistant to dilute and most concentrated acids and alkalis (with the exception of concentrated nitric acid which affects it slightly), and unaffected by methanol, butanol and acetone, but liable to swell in ether and butyl acetate. It is resistant to ozone and is soluble in benzine, benzol, mineral oil and carbon disulfide. Its electrical properties are said to be unaltered after 24 hours' immersion in water.

Cell-Tite—New Rubber Product

MADE under the Rubatex process, Cell-Tite, a new rubber product, has been developed by the Sponge Rubber Products Company, Derby, Connecticut. The new product is described as being soft, moisture proof and buoyant, with each cubic inch made up of "thousands of rubber-encased, nitrogen-filled bubbles." It is also said to be long lasting, since oxygen cannot reach its inner structure; light in weight, the only weight being that of the rubber comprising the cell walls; soft and resilient, due to the rubber itself plus the nitrogen-filled cells; vermin-proof; waterproof; a good insulator; and an excellent vibration dampener. It may be used in refrigeration on ships, trucks, railway cars, ice cream and dairy plants, and for dry ice blankets. For general marine use it may be used for boat fenders, bumpers, mooring buoys and for all types of standard life preservers.

Sponge Rubber Expansion Joints

BECAUSE the new "Express Highway", which is being built in St. Louis by the Missouri State Highway Department, is depressed with the various cross streets bridging it, considerable attention has been given to bridge and retaining wall construction both from the standpoint of durability and appearance. In the past, a pre-molded asphalt compound was used by the state for expansion joints between bridge piers and retaining walls. This material never proved entirely satisfactory as during the hot summer months the asphalt was forced out of the joints by expansion of the concrete sections and failed to pull back into position when the sections contracted.

Highway officials in specifying an expansion joint material for this particular job were anxious to obtain a material that would not only remedy this condition but also be as inconspicuous as possible. After long experimentation, sponge rubber, prepared in the Goodrich laboratories, was chosen. Thicknesses of the rubber, which vary from ¾-inch to 1-inch, are determined by the Highway Department in writing the specifications for each particular job, and are based on the cubic content of the individual sections of concrete. The thickness of the sponge rubber is designed to allow for 50% compression as the concrete sections expand in hot weather. All of the sponge rubber is furnished in a color which matches that of the finished concrete, making the joints as smooth and unobtrusive appearing as possible.

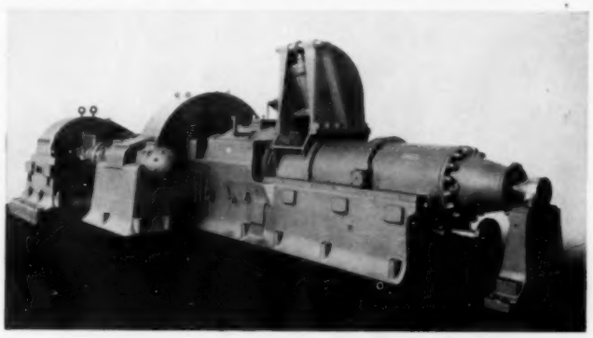
The illustrations below show the various steps in the application of the sponge rubber expansion joints, including the joint attached to a bridge pier before pouring of the wing retaining wall, a close-up of the ¾-inch joint and the method of wiring material to the pier prior to pouring the next section, and finally a finished construction with the joint permanently in place. A ¼-inch thick sponge rubber of similar design and color is also being used for expansion joints between the various sections of cement bridge railing in the construction of the "Express Highway."

LEFT: Sponge rubber expansion joint attached to a bridge pier before pouring of the wing retaining wall. CENTER: Close-up view of the ¾-inch joint showing the method of wiring material to the pier. RIGHT: View of the finished construction with the sponge rubber joint permanently in place. Photos, courtesy of B. F. Goodrich Co.

New Equipment

Streamlined Gordon Plasticator

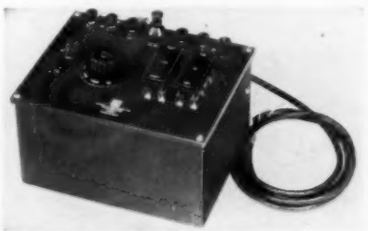
DESIGNED to please the eye and to reduce to a minimum the work of keeping it clean, a streamlined Gordon Plasticator has been introduced by Farrel-Birmingham Co., Inc., Ansonia, Conn. The new



model eliminates the protruding heads and lodging places where dust collects and which were difficult to reach in the older models. Few minor changes were made in the internal design. As in previous models, the cooling circuit can be so manipulated that extrusion temperatures are obtained which are acceptable to control laboratories of widely differing opinions on the subject of break-down, according to Farrel-Birmingham engineers.

Insulation Resistance Test Set

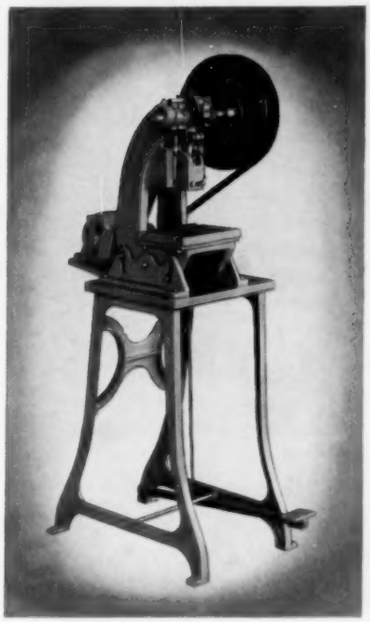
USING a guarded circuit, a new insulation resistance test set, which is said to be entirely free from the effects of leakage currents, has been developed by the Leeds and Northrup Co., 4901 Stenton Avenue, Philadelphia, Penna. The set was designed to conform to the A.S.T.M. Standard Methods of Test for



D-C Resistance of Insulating Materials (No. D-257-37T). The newly developed guard circuit shunts all leakage currents around the galvanometer, leaving only the current through the insulating material to cause the deflection. Humidity has no effect except on the dielectric under observation. Battery and galvanometer reversing switches, resistors, "Ayrton" shunt and guard circuit are contained in a small, compact instrument case. A galvanometer with guard plate, a reading device and a battery complete the assembly. Adequate protection is said to be afforded the operator from the high voltages used. Switches were designed to amplify operation and minimize calculation. Results with the new instrument are obtained by dividing the measuring deflection times its multiplier, by the calibrating deflection times its multiplier.

Rouselle Punch Press

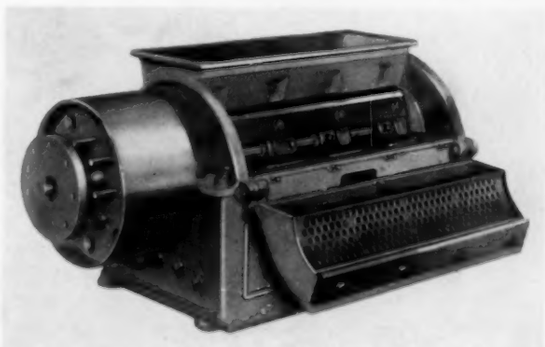
ESPECIALLY designed for trimming small, odd-shaped molded goods, the Rouselle Punch Press is featured by the David J. Ross Company, Benton Harbor, Michigan. With steel-rule dies this press can be quickly set up and used to trim practically any article



molded of hard rubber, according to its manufacturer. The press has a non-repeating clutch, stopping at each stroke regardless of the position of the foot pedal. It may be run continuously as long as the pedal is held down by the removal of a single pin. With automatic feed 10,000 operations per hour are said to be possible. Although the standard stroke is 1¼ inches any stroke up to 1½ inches can be furnished. The clutch is described as being strong, compact and easily accessible. The clutch knife is arranged to take the thrust lengthwise. The press weighs 185 pounds without stand, and 245 pounds with stand.

Sprout-Waldron Rotary Knife Cutter

AN IMPROVED rotary knife cutter, for cutting, shredding, fiberizing, granulating and cracking, has been developed by Sprout, Waldron & Co., Inc.,



Muncy, Penna. The new cutter is adaptable for cutting sponge rubber, scrap rubber, and for other reduction problems in the rubber industry. It is made in several different styles and sizes but the principle of

operation is the same, *i.e.*, a revolving cylinder or rotor equipped with knives rotates within an inclosure consisting of stationary knives and perforated screens. The material to be cut is passed through the revolving knives and as it is cut it falls through the screens. Every knife is adjustable and can be fixed so that the entire cutting steel inlay can be used. The placement of the knives prevents fibers winding around the rotor, this factor adding to the diversification of the machine. The cutters are easily accessible, hinged sides and large doors on both sides of the base providing means for reaching all interior parts. High base construction is recommended for installations where hoppers within the machine are desirable, while low bases are supplied where hand feeding or spouting is preferred. Capacities and power requirements of this new rotary knife cutter are dependent on the number of knives, screen area and the diameter of the perforations. The new cutter is known as Type SB.

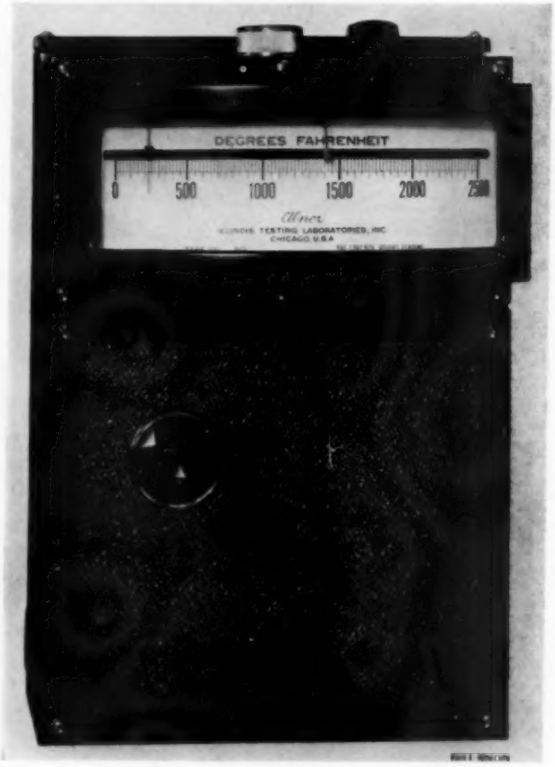
Tyrewelder Tire Building Stand

FEATURING self-adjusting properties, a new tire building stand for holding tires for inspection, for cutting off old tread stock, for cementing and for applying camel-back, has been developed by the Akron Tyrewelder Co., Division of the Akron Equipment Co., Akron, Ohio. Available in two sizes, the new device will fit tires with rim diameters of from 15 to 24 inches. Operation is simple: a locking wheel is loosened, steadied with the right hand, while a lever which

extends three arms until they automatically center the tire on the stand is manipulated with the other hand. While the stand is in use, the lever is removed from its socket and dropped conveniently out of the way in an opening provided for it at the back of the stand. A reversible ratchet enables the wheel to be locked against rotation in either direction, or to be rotated freely, this locking arrangement being particularly helpful when camel-back is applied. Over-all height of the device with its stand is 42 inches.

Alnor Electronic Pyrometer Controller

EMBODYING a new electronic principle, and designed for controlling temperatures of furnaces, molding presses (particularly electrically-heated presses), and for similar service, the Alnor Electronic Pyrometer Controller has been developed by the Illinois Testing Laboratories, Inc., 420 N. La Salle Street,



Chicago, Ill. The pointer of the indicating pyrometer carries a small vane while an adjustable target is provided which carries two condenser plates or vanes. These vanes are the capacitive element of a tuned circuit. Except at the point where the temperature indicating pointer and the target coincide the circuit is unchanged. When the temperature pointer with its vane approaches the target setting, the vanes of the pointer and target interleave and produce a circuit change which in turn operates a relay. The heating current if electric is shut-off, or in case of the fuel fired operation the fuel valve is closed partially or completely depending on the type of valve used. A red bull's eye indicates whether the heat in the furnace or press is on or off. The temperature indicating pointer is free at all times to give continuous indication and control, accordng to Illinois engineers. To assure accuracy, individually stepped and hand drawn scales are furnished with each instrument. Standard temperature ranges, from 0-1000° to 0-3000° F., or Centigrade equivalent, can be calibrated with the new pyrometer controller.

To Owners of Noble's "Latex in Industry"

The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost to all purchasers of the book. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.

Book Reviews

1937 Rubber Red Book—Directory of the Rubber Industry. Published by The Rubber Age, 250 West 57th St., New York City. 6 x 9 in. 372 pp. $2.00 (paper bound); $3.00 (cloth bound).

This directory, the first to make its appearance in the rubber industry in more than a decade, contains the following sections: a list of rubber manufacturers in the United States, divided into alphabetical and geographical sections and including a classified list of rubber products; rubber manufacturers in Canada; rubber machinery and equipment; rubber chemicals and compounding materials, including classes of chemicals, brand names and a list of chemical concerns; fabrics and textiles; reclaimed rubber; crude rubber dealers, brokers and agents; miscellaneous types of rubber, including sources of supply on balata, chicle, chlorinated rubber, dispersed rubber, the "synthetic" rubbers, guayule, master batches, powdered and softened rubber, etc.; scrap rubber dealers; rubber latex; consulting technologists; miscellaneous products, including sources of supply on printing inks, processed liners and papers, rubber labels, wax crayons, etc. In addition the directory includes the Annual Bibliography of Rubber Literature for 1936, compiled by D. E. Cable, technical librarian, General Laboratories, U. S. Rubber Products, Inc., and an article on Latex Compounding (in the latex section) by Dr. Royce J. Noble, consulting technologist. There is also a Book Section in which are listed the names, authors and contents of several recent technical books on rubber.

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How to Handle Grievances. By Glenn Gardiner. Published by the Elliott Service Co., 219 East 44th St., New York City. 5½ x 7½ in. 52 pp. 45c (flexible cover), 60c (stiff cover).

Specifically written for factory managers and other executives whose lot it is to maintain efficient and harmonious employment relations, this pocket-size book amplifies the series of articles on management-labor relations which appeared in recent issues of "Management Information," a weekly bulletin issued by its publishers. It presents in a direct and practical way the fundamental principles which the author has found to be effective in handling employee grievances. The material is so presented that it may be used by individuals as a guiding manual or as a text for companies to better train their supervisory forces in the handling of grievances. Ample blank ruled pages are provided for the reader to make notes as the text applies to his individual problems.

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A. S. T. M. Standards on Rubber Products. American Society for Testing Materials, 260 South Broad St., Philadelphia, Penna. 6 x 9 in. 238 pp. $1.25.

This latest volume of the A. S. T. M. standards on methods of testing and specifications of rubber products, prepared as usual by Committee D-11 on Rubber Products, contains all of the 25 standards issued by the Society in their latest approved form. There are 15 methods of testing procedure and 9 specifications, plus a proposed specification for rubber insulating blankets for use around electrical apparatus. In addition to the standards, a bibliography is included which gives sources of information concerning properties and testing of rubber and rubber products.

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Guide Book of Electrical Insulating Materials. Mitchell-Rand Insulation Co., 51 Murray St., New York City. 4 x 9¼. 40 pp.

The company's extensive line of electrical insulating materials, including Rubberseal Copper, a new waterproofing material, is described and illustrated in this guide book. Insulating papers, sleeving, tape, twines and tubing are among the materials discussed. Sizes and prices are included.

Flow Carbon—The Story of Pellet Black. Published by the Binney & Smith Co., 41 East 42nd St., New York City. 7¼ x 9½ in. 82 pp.

The development, perfection and use of pellet black is well told in this attractively printed, spiral-bound book. The book consists of 12 chapters divided into 5 parts, *i. e.*, Development, Properties, Application, Protection and Testing. In addition there is a section devoted to the history of the material as well as a complete subject index. Photographs and drawings are used throughout to emphasize the text. By means of charts and diagrams the reader is acquainted with Binney & Smith's production methods. Chemists and factory managers will be particularly interested in the chapter devoted to mill and compound room technique. Several new theories of dispersion are discussed. Every rubber technologist should read this new book.

Booklets, Catalogs, etc.

News About DuPont Rubber Chemicals (November 5, 1937). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼ x 9½ in.

Five special reports are included with this latest issue of the company's house organ, the number in parentheses being that of the report: Hot Water Bottles and Syringe Bags (206); Latex Compounding (IR-10); Use of Rubber Peptizing Agents for Making Liquid and Viscous Rubbers (P-4); Neoprene—Channel Black Masterbatches (N-8); and Compression Characteristics of a Neoprene Stock and a Similar Rubber Stock (N-9). A reprint of the article "Extrusion Qualities of Rubber" by Arthur H. Nellen of Lee Tire and Rubber Co., is also included.

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Micromax Temperature Instruments for the Steam Plant. (Catalog N-33-163). Leeds & Northrup Co., 4902 Stenton Ave., Philadelphia, Penna. 7¾ x 10½ in. 32 pp.

Of interest to those concerned with steam generation, whether in central stations or industrial plants, this catalog tells how temperature measurements help to effect operating economies. It describes three methods of measurement: (1) the thermocouple pyrometer; (2) the resistance thermometer; and (3) the optical pyrometer. The company's line of Micromax indicators, recorders, controllers and accessories for steam-plant use is illustrated and described.

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Life, Liberty and the Pursuit of Happiness! National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland, Ohio. 6 x 9 in. 18 pp.

Profusely illustrated, this booklet compares the products of 30 to 40 years ago with those of the present day, the latter made possible by today's improved machines, materials and methods, and points out the fact that machinery does not enslave—it emancipates. The development of automobiles, tires, airplanes and office equipment are among the subjects pictorially presented as examples.

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Neville Coal-Tar Products. The Neville Co., Pittsburgh, Penna. 8 x 11 in. 4 pp.

A complete list of Neville products, accompanied by brief descriptive data, is contained in this leaflet, including the company's synthetic resins, solvents, plasticizing oils, oils, and tar products. A graphic derivation chart of coal by-products is also shown, with their respective uses indicated.

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Sealed. New Departure Division of General Motors Corporation, Bristol, Conn. 5½ x 8½ in. 16 pp.

The successful application of anti-friction bearings, which keep dirt out, keep lubricant in, cut maintenance and simplify design, according to the New Departure concern, is discussed in this booklet. The company's line of self-sealed ball bearings is described and illustrated.

Editorial Comment

TO ITS many friends in the rubber and allied industries THE RUBBER AGE takes this opportunity of extending its sincere wishes for a Merry, Merry Christmas and Happy Days in the coming year.

THE PUBLISHERS

New Tire Warranty

STILL another progressive step forward has been taken by some of the tire manufacturers in their adoption of a new tire warranty. This warranty is given to the purchaser of each new tire in the form of a certificate and assures him that the tire is guaranteed to be free from defects in workmanship and materials and to give satisfactory service under normal operating conditions. It also assures him that the manufacturer will either repair the tire or make an allowance on the purchase of a new one if any defects are revealed.

The most striking factor of this new warranty is its simple language. Whereas the previous "road hazard guarantee" was couched in legal phraseology far above the understanding of the average individual, the new warranty simply and quickly tells him exactly what the tire maker guarantees—in his own language. This simple phraseology will undoubtedly strengthen the competitive position of the tire manufacturers. The tire industry in general would do well to adopt this or some similar form of warranty since its wide-spread use will cut down the large number of unjustified repairs or returns—one of the thorns in the side of the industry.

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Status of the Trade

OPERATIONS in the rubber industry have showed declines in the past two months in keeping with those in other fields. Despite the lay-offs and reduced working hours which many manufacturers have had to put into effect, however, the industry is far from a precarious position. Babcock, Ayres, Kiplinger and other economists are agreed that the current lull is only temporary. Many lay the blame at the door of the Administration, claiming that uncertainty regarding government moves and taxes is holding up expansion programs which would immediately create new work all around.

That the rubber manufacturers themselves consider the current movement as only temporary is indicated by the prophecies for 1938. One leading executive has made the prediction that operations in 1938 would equal that of 1936. If achieved, such an accomplishment would be completely satisfactory, although the margin of profits would be somewhat smaller since labor and raw materials costs have jumped considerably in the past twelve months. Increased prices on tires and mechanical goods and other products which have occurred in recent months closed up the margin between cost and profit opened by these higher costs, but are not believed to have closed the gap entirely.

The rubber industry may look back at the past twelve months with satisfaction. Mechanical rubber goods have increased their status in the industry considerably, now representing approximately 18% of the value of all rubber products. The tire industry has steered clear of all price wars. Other divisions have shown small gains. With this record behind it the rubber industry should face 1938 with full confidence.

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Ending of Decentralization

DECENTRALIZATION of the rubber industry from Akron has run its course. This is the opinion of John Love, noted business commentator and economist. Mr. Love has carefully watched the progress of decentralization from the "rubber city" and attributes its start to the restlessness of the Detroit automobile manufacturers who depend in great part on the Akron rubber manufacturers for needed parts and accessories as well as tires.

A summation of the decentralization movement reveals that Goodyear opened a new factory at Jackson, Michigan, and also increased the capacity of its Gadsden and Los Angeles plants; Goodrich started a plant at Cadillac, Michigan, and turned part of its reclaiming plant at Oaks, Pennsylvania, over to tire manufacturing; Firestone located a factory at Memphis, Tennessee; General bought a plant at Wabash, Indiana; etc.

Some of these new plants are already in operation; others are still being equipped; still others have started with low production. The inevitable result of the decentralization movement, whether it be attributed to labor difficulties at Akron, to planned expansion programs, or to necessary motives of economy, will be the reduction of the number of tire units previously turned out in Akron factories. When these new plants really get under way then William O'Neill's prediction that Akron will lose out on about 30,000 tires a day will probably come true.

CURRENT • NEWS
of the Rubber Industry

DECEMBER, 1937

1936 LEVEL SEEN FOR TRADE IN 1938

Corporate Profits Would Be Smaller If This Level of Activity Should Be Reached Because of Increased Costs of Labor and Raw Materials

Operations in the rubber industry during the coming year should equal the 1936 level in the opinion of several company officials. This prophecy indicates that operations will decline slightly from 1937 levels, which are expected to show a slight increase over the previous year's records. Such a level of activity next year would generally be regarded as satisfactory by the industry, it is indicated, although corporate earnings would probably be somewhat smaller than in 1936 with the same volume of business, since production costs have risen sharply in the interval.

In 1936 American rubber manufacturers consumed approximately 573,000 long tons of crude rubber, an all-time record which was 20% larger than the previous high recorded for 1929. Although the 1937 consumption figure still remains in doubt it is expected to exceed the previous year's figure by a small margin. Consumption for the first nine months of the current year totaled approximately 441,096 long tons which was 3.8% larger than that for the corresponding period of 1936.

Effects of Stock Market Felt

Discussing 1938 prospects, one rubber authority pointed out that the effects of the stock market recession will probably be felt for a considerable time and that the automobile industry will undoubtedly have to revise its estimates downward for next year.

Although tire inventories have not been moving as fast as the industry had hoped (as pointed out in another article in this issue) the general price structure for finished products is still regarded as unthreatened at the present time. The increase in tire prices last spring was caused by higher labor and rising raw material costs but did not adjust prices to the new cost levels. Subsequent adjustments also failed to bring prices up to these production levels and therefore additional price rises are anticipated.

Tire companies, incidentally, are giving considerable attention to the effect current reduced prices of rubber and cotton will have on earnings and possible surtax liability. Substantial write-downs with consequent curtailment of profits are a certainty in earning reports covering the current calendar year now that rubber is around a 15-cent figure, many manufacturers having committed themselves earlier in the year to higher-priced rubber.

Such write-downs as applied to stocks of raw materials on hand will lower surtax liability. It is understood, however, that write-downs on commitments for raw materials will not constitute a credit against surtax liability and it is considered debatable whether write-downs of finished goods will create such credits, particularly in the case of companies which have not followed a policy of writing down finished goods in the past.

Rubber Protects Fruit

The use of sponge rubber cushions on grading machines to prevent loss of apples due to bruising and decay has been suggested by C. W. Ellenwood, horticulturist of the Ohio Experiment Station. He revealed that studies at the station had indicated that much bruising can be avoided if a little extra care is taken during the grading process and said that the use of sponge rubber to serve as a cushion on grading machines had been found valuable in preventing bruises. He also pointed out that in the highly competitive apple market the appearance and condition of the fruit is of prime importance.

Liquidating Acme Rubber

The Acme Rubber Company, Massillon, Ohio, is in the process of liquidation, according to word from S. H. Rubiner, treasurer. The Acme concern, which was formed several months ago and which represented a merger of the Hankins and Gold-Lov Rubber companies, manufactured rubber gloves exclusively. The plant at Massillon is being offered for sale. Mr. Rubiner can be reached at 1927 Twelfth Street, Detroit, Michigan.

RUBBER QUOTAS DROPPED TO 70%

Drop of 20% in Permissible Exports from Signatory Countries for the First Quarter of the New Year Is More Drastic than Early Estimates

Permissible quotas under the restriction scheme, which were set at 90% for the last quarter of the current year, were cut sharply to 70% of basic production for the first quarter of 1938 by the International Rubber Regulation Committee at a meeting held in London on November 30. The announcement, of course, resulted in a sharp increase in the price of crude rubber in the New York market for both actuals and futures. The cut was more drastic than had been expected in trade circles.

Permissible exports from signatory countries to the restriction cartel under the new quotas will be approximately 226,669 long tons for the first three months of 1938 as compared with 283,362 long tons during the current quarter, a reduction of approximately 56,693 tons. These figures do not include shipments from Siam or Indo-China, both signatories but both operating under special quota allotments, nor from non-participating countries in the agreement. The drop in tonnage for the first quarter of 1938 is expected to offset the decline in American consumption and bring up the price of spot rubber to approximately 18 cents. (It is now around 15 cents).

Consumption Prediction Ignored

Announcement of the 70% figure indicated that the Restriction Committee had paid little heed to the insistence of American rubber manufacturers, as expressed by their representatives, that a large increase in consumption is anticipated during 1938. It was felt, however, that if this expected increase is evident in consumption figures for the early months of 1938 the Restriction Committee would not continue the 70% figure for the second quarter of that year but would make the necessary adjustment.

Another reason for the drastic 20% cut in the quotas is believed to be due to the fact that the shrinkage of available stocks has been stopped in the last month or two.

RHODE ISLAND CLUB ADDRESSED BY TULEY

W. F. Tuley, of the Naugatuck Chemical Division of U. S. Rubber Products, Inc., and "Tuss" McLaughry, head football coach of Brown University, were the principal speakers at the winter meeting of the Rhode Island Rubber Club, held at the Narragansett Hotel in Providence on December 3. A bowling tournament was held before the meeting at which prizes, donated by the Federal Products Corp., Akron Standard Mold Co., and Givaudan-Delawanna, Inc., were awarded to high scorers.

The rubber industry would not be known as it is today without organic accelerators of vulcanization, Dr. Tuley said in opening his address on "Why Modern Accelerators?" He defined the term "accelerator" and presented its development chronologically from the time of Charles Goodyear's discovery of vulcanization up to the present, including both inorganic and organic types. The speaker touched on dispersion, scorching and frosting subjects and then went on to discuss a recent development, *i. e.*, the discovery of the ability of accelerators to accelerate the plastication of rubber. In this connection he said that this newly discovered property is almost specific for the thiazole accelerators although the guanidines also show some effect.

Dr. Tuley then described a T-50 test, one of the newer tests for evaluating and studying accelerators. He stated that this test is a quantitative extension of the old ice test and presented a table giving the comparisons of various accelerators indicated by the T-50 test. In concluding his paper, the speaker discussed future accelerator developments and stated that as much progress is being made today in the field of acceleration through the effective use of mixtures as was formerly made by the introduction of new materials.

Selecting "Modern Football" as his subject, Coach McLaughry described some of the outstanding plays of the season. He explained the latest rules which govern the football game of today and drew references to many of the older rules. In addition he showed a slow motion movie of the Brown-Rutgers game and pointed out a few of the trick plays uncovered. As an added feature, A. R. Lukens of the Thompson-Weinman Co., recently elected secretary-treasurer of the Boston Rubber Group, showed some beautiful colored pictures taken at the outing of that group last summer.

Change Pontex Trade Name

E. I. du Pont de Nemours & Co., Inc., has changed the name of Pontex, the latex-saturated material used in the shoe and other industries, made by its Fabrikoid Division, to Texon. This is in keeping with the company's new policy on the use of trade names. A description of Texon (then called Pontex) appeared in the July, 1936, issue of THE RUBBER AGE.

Coming Events

Dec. 17. Xmas Party, New York Group, Rubber Division, A.C.S., Building Trades Club, N. Y.

Jan. 4. Los Angeles Group, Rubber Division, A.C.S., Mayfair Hotel, Los Angeles.

Mar. 28-29. Spring Meeting, Rubber Division, A. C. S., Book-Cadillac Hotel, Detroit, Mich.

Apr. 18-21. Spring Meeting, American Chemical Society, Dallas, Texas.

May 23-25. London Rubber Conference, London, England.

Oct. 10-14. National Safety Congress, Hotel Stevens, Chicago, Ill.

DETROIT GROUP HAS FIRST WINTER PARTY

The first winter party of the recently-formed Detroit Group, Rubber Division, A.C.S., was held at the University Club in Detroit on December 8. The meeting was attended by 105 members and guests. Entertainment for the occasion was furnished by H. Walter Grote of the United Carbon Company who performed a few of his feats of legerdemain. Door prizes were distributed to holders of lucky numbers.

The featured speaker of the evening was A. H. Brown, Jr., of the Research Department of the Detroit Edison Company. His subject was "Rubber Springs." Mr. Brown explained the theory of vibration and then discussed the reactions of springs made of various materials, including steel and rubber. In describing the relation between damping and vibration he explained that when steel is used in a coil spring it has comparatively small internal friction and thus produces an almost negligible amount of damping while rubber, which may be easily compounded to produce a relatively great amount of internal friction, 50 or more times that of steel, can thus produce a relatively great amount of damping. This, perhaps is the most important reason why rubber springs have been termed superior to steel springs in most applications.

Mr. Brown then discussed forced vibrations with and without damping and also transmission of high frequency vibrations. He stated that once the factors of the resistance to the transmission of relatively high frequency vibrations are evaluated improved spring designs should result. He prophesied that the improvements would include combinations of rubber and steel, particularly for heavy machinery, such as steam turbine foundations, railway equipment, trucks, etc.

CANADIAN GROUP HEARS DR. MARTIN

A meeting of the rubber sections of the Toronto and Hamilton Chemical Associations was held in the Chemistry Building of the University of Toronto, in Toronto, Canada, on November 26. Prior to the meeting 63 members and guests gathered for dinner at Hart House on the campus of the university. Over 100 attended the meeting itself which was presided over by G. R. Smye of Firestone and which was addressed by S. M. Martin, Jr., of the Thiokol Corporation, Yardville, N. J.

Taking "Thiokol Synthetic Rubber" for his topic, Dr. Martin chose Thiokol DX of the four types available for discussion. He revealed that the three major considerations involved in compounding a Thiokol DX stock are (1) incorporation of a vulcanizing agent, (2) selection of a suitable plasticizer when necessary, and (3) use of suitable reinforcing pigments.

Zinc oxide is the vulcanizing agent, according to the speaker, and it is used in amounts of between 5 and 10 parts on 100 parts of Thiokol DX. Altax, when used in amounts of from .10 to .20 parts on 100 parts of Thiokol DX gives all the softening that is normally necessary for processing, while the carbon blacks are the best reinforcing pigments, these differing in their behavior in the stock. The soft blacks can be used in higher amounts than the channel blacks, Dr. Martin said. The type of black and the amount used is influenced by the properties desired in the cured stock.

In addition to being highly resistant to oils and solvents, Thiokol DX stocks, when compounded with black pigments, are also sun-resistant, Dr. Martin pointed out, and a stock made with a blend of 50 parts of Thiokol DX and 50 parts of rubber, which contains an antioxidant and a sun-proofing material, has also been found to be non-checking in the sun. Curb pump hose covered with such a stock is now being tested, Dr. Martin revealed.

Several slides illustrating different properties of Thiokol compounds were shown during the address in addition to a large number of samples of processed material and finished products. A lengthy and lively discussion followed the presentation of the paper.

Christmas Party at Chicago

The Chicago Group, Rubber Division, A.C.S., was scheduled to hold its annual Christmas-Ladies' Night Informal Dance on December 10 at the Hotel Sherman in Chicago. An informal reception was to have been held in the "Blue Room" and dinner served in the "College Inn" where entertainment was to have been provided by an elaborate floor show. This annual affair, first introduced last year, proved very popular, and it is presumed that a good time was in store for all those attending this year's function.

LOS ANGELES GROUP ELECTS OFFICERS

Ed Royal, of the H. M. Royal Company, was named chairman of the Los Angeles Group, Rubber Division, A.C.S., for the 1937-38 season, at the December supper meeting of the group, held at the Maytair Hotel in Los Angeles on December 7. He succeeds T. Kirk Hill of the Kirkhill Rubber Company. Other officers elected were M. Montgomery (Martin, Hoyt and Milne), succeeding Carl Stentz (Darnell) as secretary-treasurer, and G. A. Drew (Schrader) succeeding Art Wolff (N. J. Zinc) as vice-chairman.

The meeting, attended by 91 members and guests, was addressed by Dr. William G. Campbell, assistant professor of education at the University of Southern California. Mr. Williams spoke on "The Significance of the Conflict in the Orient" and showed motion pictures in color of scenes taken in both China and Japan including some taken by himself and his photographer during the recent air bombing raids on Shanghai.

During the business session, Carl Stentz, the retiring secretary-treasurer, reported that the group was in good financial condition and that the average monthly attendance during the past year had reached a new high. The committee on the proposed scholarship to be sponsored by the group turned in an unfavorable report but recommended specific effort on the part of the group toward securing more scientific books on rubber for Los Angeles public libraries. T. Kirk Hill, retiring chairman, agreed to resume the responsibility for this effort.

The door prize, consisting of five Grayco neckties donated by THE RUBBER AGE, was won by M. L. Paine (Firestone), while the special prize, a 20-pound turkey donated by the group, was won by T. Kirk Hill. Table favors, combination whisk brooms and shoe polishers, were distributed by Firestone through R. E. Hutchins. The group also indulged in some community singing, led by Bill Shawger of the D. and M. Machine Works.

N. Y. Christmas Party

The annual Christmas party of the New York Group, Rubber Division, A.C.S., will be held on Friday, December 17, at the Building Trades Club, 2 Park Avenue (at 33rd Street) in New York City. According to Mr. Wilson, secretary of the Group, the party will be limited to 300 — the capacity of the room. Prior to the "party," Prosper E. Cholet of H. Muehlstein and Company will deliver an address on "Recent Experiences at the Plantations" and will illustrate his talk with still and motion pictures. Movies of the Group's outing last summer will also be shown. Tickets, which are $2.50 each for paid-up members and $3.50 for non-members and guests, may be secured from B. Brittain Wilson, c/o *India Rubber World*, 420 Lexington Avenue, New York City.

BOSTON RUBBER GROUP ELECTS NEW OFFICERS

G. W. Smith

E. H. Krismann

A. R. Lukens

The Boston Group, Rubber Division, A.C.S., held its Fall meeting on November 19 at the Kenmore Hotel in Boston, Mass., with more than 125 members and guests attending. Before the speakers of the evening were introduced, new officers for the 1937-38 season were elected as follows: *Chairman*, George W. Smith (Barrett Co.); *Vice-Chairman*, E. H. Krismann (DuPont); *Secretary-Treasurer*, A. R. Lukens (Thompson-Weinman); *Executive Committee*, R. J. Noble, retiring chairman, Gladding Price (Vanderbilt), and J. C. Walton (Boston Woven Hose).

Williams Delivers Feature Address

The feature address of the evening was given by Ira Williams of the Jackson Laboratory of E. I. du Pont de Nemours & Co., Inc., on the subject of "Peptizing and Gelling Effect in Rubber." An abstract of this paper follows:

Natural rubber is created at a relatively high energy level and in only a semi-stable condition. A slight chemical attack is sufficient to start the rubber in a spontaneous change toward a lower energy level. Attack of strained rubber by oxygen is sufficient to produce an irreversible change which results in more plastic rubber. The oxidized rubber is soluble while unoxidized (gel) rubber is insoluble in the absence of oxygen.

Rubber attacked by sulfur also assumes a new state at a lower energy level. In this case a more firm and less soluble gel is produced which, however, can be peptized in the presence of various peptizing agents. While chemical attack usually produces a noticeable effect the properties of the resulting product cannot always be predicted. We cannot explain why sulfur causes a more rigid and oxygen a less rigid structure to be built.

Cases of apparent reversible sol and gel transformations have been observed. While an alternating similarity of properties may recur each succeeding sol or gel differs from the previous one. Rubber may be plasticized with oxygen and be returned to a less plastic condition by means of sulfur or benzoyl peroxide. A rubber sol may be gelled with ethyl magnesium bromide and then peptized with water but the final sol differs from the original.

Rubber sols containing zinc oxide and sulfur may be gelled with Pip Pip accelerator and then peptized by the addition of more accelerator. The new sol will again gel and can be again peptized. The system, however, reaches a condition which will no longer peptize showing that the process was not a reversible one. All changes of rubber are toward a lower energy level.

Sound Film Also Presented

The second speaker was Mr. E. L. Foss of General Motors who delivered an address in conjunction with the presentation of a sound film called "Previews of Progress." Scientific developments which are currently in use on a limited scale but for which greater use are foreseen shortly were shown and described by Mr. Foss. Included among the objects discussed were a new wool yarn made from milk, a new type of magnetized alloy, and a new product intended to eliminate all headlight glare during night driving.

A movie taken of activities at the first annual outing of the Group, held at Marshfield, Mass., last summer, was shown by Mr. Lukens, the new secretary-treasurer, and considerable enjoyment was occasioned by the antics of the golfers and other sports enthusiasts.

Akron Group Meets

The first winter meeting of the Akron Group, Rubber Division, A.C.S., was held on December 3 at the Akron City Club. The meeting was attended by approximately 250 members and guests. The featured speaker of the evening was Frederick O. Anderegg, consulting specialist on building materials. Discussing fibreglas, the latest development of the glass industry, Mr. Anderegg disclosed that this new material may be composed of comparatively coarse fibers for air filters, fine fibers for insulation, and very fine fibers for textiles. He discussed the advantages offered in these three fields by fiberglas and compared them with materials now in use. The new material was developed by the Industrial and Structural Products Laboratory of the Owens-Illinois Glass Company at Newark, Ohio.

NEW ENGLAND NEWS

Armstrong Rubber Co., Inc., West Haven, Conn., manufacturer of tires, tubes and batteries, is reported as having under consideration a plan to move its entire plant to Natchez, Miss., where a $1,000,000 plant would be erected. Citizens of the Mississippi community recently voted to authorize issuance of $300,000 in bonds with which to purchase a site and erect a building for the company. Armstrong is said to have guaranteed employment for 400 men at $25 a week wages when in full operation.

Rubber footwear plants of U. S. Rubber Products, Inc., Naugatuck, Conn., shut down over the Thanksgiving week-end from November 24 to 29, and operations of the waterproof, bathing shoe and tennis divisions were suspended until December 7. The Kedettes, sport shoe and sponge rubber sections resumed production on November 29. The company recently was awarded a $27,960 Federal government contract for overshoes.

Goodyear Rubber Co., Middletown, Conn., laid off its night shift on November 29 for an indefinite period because of the slump in orders due to the weather. The day shift continues operations.

Congressman J. Joseph Smith of Waterbury, Conn., has been registering vigorous protests with the trade agreements section of the State Department at Washington against the proposal to include rubber footwear in the pending reciprocal agreement with Czechoslovakia. Naugatuck, with its footwear mills of U. S. Rubber Products, Inc., is in Congressman Smith's territory.

Thirty-seven employees of the Middletown Rubber Co., Middletown, Conn., have organized the Middletown Rubber Co. Independent Union, and have elected a complete slate of officers. It is understood the union has no connection with any national labor body.

Governmental attempts at price control, "a favorite panacea," have failed every time they have been tried, Franklin R. Hoadley, president of the Atwood Machine Co., Stonington, and formerly an executive of the Farrel-Birmingham Co., Inc., Ansonia, told the Bridgeport (Conn.) Manufacturers' Association at its 37th annual meeting on November 23. The former rubber machinery manufacturer's topic was "Industrial Panaceas."

A. G. Spalding & Bros. Co., Chicopee, Mass., and the Spalding A. F. of L. Union terminated long negotiations on November 18 when the first union contract in the company's history was signed by William F. Reach, Spalding general manager, and William A. Dynan, union president. A compromise agreement was reached on the issue of seniority rights, which had been the chief stumbling block. The union has about 1,000 members.

Slackening of demand has caused some layoffs in the two Spalding plants, resulting in a request from the union that both plants be placed on a 30-hour schedule instead of 40, thus spreading the work and avoiding further layoffs. The tennis department was hardest hit by the curtailment.

May Drop Goodyear Case

Although future steps in the case of the Federal Trade Commission vs. Goodyear Tire and Rubber Company are dependent on what the Commission's attorneys may decide after a thorough study of the recent ruling by the United States Circuit Court of Appeals, which upset the government agency's ruling and returned it to that body for further hearings, it is believed that the four-year case is at an end. Especially is it believed unlikely that the F. T. C. will re-open the hearings which resulted in voluminous testimonials. One government attorney was quoted as stating that before a new case could be brought against Goodyear there would have to be a violation of the Robinson-Patman Law, since most of the fundamental objections raised by the F. T. C. in its case against Goodyear were written into that law. It is further believed that Goodyear's rigid conformance to the terms of the Robinson-Patman Law will eliminate any possibility of the company's being subject to triple damage suits by competitors or tire dealers. The original case hinged on the charge that Goodyear had discriminated in favor of Sears, Roebuck & Company, its largest single customer.

Rubber Trade Officers

At a special meeting of the Rubber Trade Association of New York, Inc., held on November 18, the number of directors of the association was ordered increased from seven to nine. At the annual meeting, which followed the special meeting, the following were elected as directors to serve for one year: Robert Badenhop, Philip Billhardt, Wm. E. Bruyn, A. L. Grant, L. V. Keeler, J. Louis, H. Muehlstein, D. A. Paterson, and W. G. Smith, Jr. With the exception of Mr. Billhardt and Mr. Louis all of the directors are serving their second or more consecutive terms. The new directorate then elected the following officers for 1938: *President*, H. Muehlstein; *Vice-President*, A. L. Grant; *Treasurer*, L. V. Keeler. B. G. Davy was re-appointed secretary-manager.

Postpone Overman Case

At a hearing before Judge Clancy in the District Court of the United States for the Southern District of New York on November 16 on reorganization proceedings for the Overman Cushion Tire Co., Inc., of New York City and Belleville, N. J., it was revealed that Government tax authorities had refused to accept new preferred stock as part of any reorganization plan but would consider a so-called token payment or lump sum in settlement of the principal tax items due the Federal Government. What this amount will be has not yet been determined although conferences are being held between Government representatives and Overman officials. In view of these circumstances, Judge Clancy postponed further reorganization considerations to December 16th and continued the debtor (Overman) in charge of its own affairs. The court also decreed that December 16th be fixed as the last day for creditors to file claims and stated that any debtor failing to file by that date would be given no voice in reorganization proceedings. Claims were to be filed with O. W. Ehrhorn, United States Court House Building, Foley Square, New York City.

Guayule Imports Increase

Imports of guayule rubber into the United States amounted to 2,053 long tons during the first nine months of the current year which compares with only 821 tons in the corresponding period of 1936, according to the Department of Commerce. Monthly imports were in excess of 300 tons during July, August and September.

TRENTON NEWS

Business is reported to have dropped off considerably at some of the rubber factories in the Trenton area with the result that several of them have been compelled to lay off help and reduce working hours. Other manufacturers, operating under better conditions, report difficulty in securing ready cash for payrolls. An air of optimism, however, prevails for the early months of 1938.

Essex Rubber Co., Trenton, is busy filling orders for soles and heels for the winter trade and reports no slack in business.

Thermoid Co., Trenton, has purchased two tracts of land adjoining its factory to be used for future expansion.

Lambertville Rubber Co., Lambertville, is busy again and has increased its working force to approximately 400. Lambertville, which is operating under a temporary trustee (John T. Crowley, company president) manufactures a full line of rubber footwear.

RUBBER DIVISION TO MEET IN DETROIT

The Spring Meeting of the Rubber Division, A.C.S., will be held at the Book-Cadillac Hotel in Detroit, Michigan, on March 28 and 29, according to an announcement by the Executive Committee of the Division. It is suggested that those planning to attend make their reservations as early as possible. The regular Spring Meeting of the American Chemical Society will be held in Dallas, Texas, on April 18 to 21.

According to A. R. Kemp of the Bell Telephone Laboratories, chairman of the Division, the deadline for receiving papers to appear on the program is February 21. Papers should be submitted to the Chairman of the Papers Committee, G. K. Hinshaw, Goodyear Tire and Rubber Co., Akron, Ohio. Four copies of each paper, together with an abstract of 200 words or less, must be submitted.

It was also announced that copies of the preliminary program of the London Conference, which will be held during the week of May 23rd, are now available and may be secured from C. W. Christensen, secretary of the Division, c/o Rubber Service Laboratories Division of Monsanto Chemical Co., 1012 Second National Building, Akron, Ohio. All those planning to attend the Conference are urged to secure a copy of the program. The Committee on Arrangements for the Conference consists of Dr. A. A. Somerville (R. T. Vanderbilt) as chairman, and W. B. Wiegand (Binney & Smith) and J. M. Bierer (Boston Woven Hose). Technologists who wish to present papers at the conference should submit four copies, together with an approximate 200-word abstract, to A. R. Kemp, Bell Telephone Laboratories, 463 West St., New York City, not later than March 1.

The Executive Committee has ordered the names of all non-paying members of the Rubber Division removed from the mailing list of *Rubber Chemistry & Technology*, and the secretary therefore urges all such members to promptly forward their dues since the Committee's order is effective on January 1, 1938. Because the stock of back issues of *Rubber Chemistry & Technology* has become exhausted the secretary has been authorized to offer special prices on these back issues, the money to be applied against future dues. $2.50 is offered for each copy of Vol. 1, No. 1; Vol. II, Nos. 1 and 2; Vol. III, Nos. 1 and 2; and $1.00 for Vol. IX, Nos. 3 and 4; and Vol. X, No. 1. The copies should be sent to Mr. Christensen.

Re-Opens Second Unit

Wilson Rubber Company, Canton, Ohio, has re-opened its second manufacturing unit which has been closed for the past three years, all operations of the company being confined to its main plant.

Continental Tank Cars

Specially constructed tank cars (one of which is illustrated below) are now being used by the Continental Carbon

Company for shipments from its Sunray, Texas, carbon black plant. These cars are reported to have several advantages over other types in use. The Sunray plant, which covers more than 160 acres, is in the heart of the Texas Panhandle. Continental maintains its headquarters at 295 Madison Avenue in New York City.

Gadsden Hearing Ended

The hearing by the National Labor Relations Board at Gadsden, Alabama, of charges of unfair labor practices brought by the rubber union against the Goodyear Tire and Rubber Company has been concluded. Over 8,000 typewritten pages of testimony, several hundred pamphlets and other exhibits are included in the material which the labor board must consider before rendering its verdict. Union officials accused Goodyear of conducting a "reign of terror" at Gadsden, where the union failed to organize the workers, while Goodyear countered with similar accusations against the union. A decision is not expected for some time.

Financial News

Raybestos-Manhattan, Inc.

Nine months ended September 30: Net income amounted to $2,064,035, equal to $3.25 per share after providing for all charges, expenses and taxes, and after adding $150,000 to the reserve for contingencies for the surtax on undistributed profits, etc. This compares with net income of $1,461,525, or $2.30 per share, before providing for the surtax, in the corresponding period of 1936. The regular 50-cent dividend per share has been declared, payable on December 15 to stockholders of record on November 30.

Baldwin Rubber Co.

Nine months ended September 30: Net profit amounted to $401,828 after depreciation, interest, Federal income taxes and other charges. As a result of distributions made to stockholders no profits remain undistributed and Baldwin is not liable for any surtax on undistributed profits for the nine months covered to date.

RUBBER CONSUMPTION DROPS IN OCTOBER

Consumption of crude rubber by manufacturers in the United States during the month of October is estimated to be 38,707 long tons, which compares with 43,893 long tons during September. October consumption shows a decrease of 11.8% under September and is 22% under October a year ago according to statistics released by the Rubber Manufacturers Association. Consumption for October, 1936, was 49,637 (revised) long tons.

Gross imports of crude rubber for October are reported to be 52,508 long tons, a decrease of 6.3% under the September figure of 56,049 long tons but 28.3% over the 40,920 long tons imported in October, 1936.

Total domestic stocks of crude rubber on hand on October 31 are estimated at 195,685 long tons, which compares with September 30 stocks of 182,556 long tons and 224,000 (revised) long tons on hand October 31, 1936.

Crude rubber afloat to United States ports as of October 31 is estimated to be 80,653 long tons, which compares with 83,288 long tons afloat on September 30 and 67,825 long tons afloat on October 31 a year ago.

October reclaimed rubber consumption is estimated at 12,234 long tons; production at 15,849 long tons; and stocks on hand on October 31, at 23,572 long tons.

Question Sears Guarantee

Representatives of Sears, Roebuck and Company, mail order and retail chain, have been directed by the State Corporation Commission of Virginia to show cause why the company should not be fined for alleged violation of the state law in respect to operation of its tire guarantee. The Virginia Commission holds that the offer to replace defective tires within a stated period, known as the "road hazard guarantee," constitutes a form of insurance and that Sears-Roebuck is not licensed to conduct an insurance business in Virginia. The State of Ohio recently indicated that it too holds such guarantees to be a form of insurance, although no actions were brought by the state.

Firestone Latex Officers

Officers of the recently-organized Firestone Rubber and Latex Products Company of Fall River, Mass., new subsidiary of the Firestone Tire and Rubber Company, Akron, have been named as follows: *Chairman of the Board*, Harvey S. Firestone, Sr.; *President*, H C. Miller; *Treasurer*, Timothy F. Doyle; *Secretary*, John H. Joss. The board of directors includes Messrs. Firestone and Miller and John W. Thomas, president of Firestone Tire and Rubber Co., Lincoln P. Holmes, and Richard K. Hawes. The factory is expected to be in operation by next spring.

Names in the News

DR. D. E. CABLE, technical librarian, General Laboratories, U. S. Rubber Products, Inc., became a proud parent on December 8 with the arrival of Henry Donald. Both mother and baby are reported doing well.

DR. GEORGE KRATZ, consulting chemist and New York representative of the Vultex Chemical Company, has returned to his office after a six-week illness.

TED SULLIVAN, of Vansul, Inc., New York City, who was stricken with paralysis several months ago, has left for the South where he will spend the next few months recuperating. Although his left side is still paralyzed, doctors hold hope for his eventual complete recovery.

E. H. BROADWELL, former sales director for the Fisk Rubber Company and one-time vice-president of the Rubber Manufacturers Association, has been named managing director of the Cycle Trades of America, trade association of the bicycle manufacturers.

SIDNEY B. HASKELL, formerly president of the Synthetic Nitrogen Products Company, has accepted a position as vice-president of the Barrett Company, New York City. He has been placed in charge of the Ammonia Department.

HARVEY S. FIRESTONE, Sr., chairman of the board, Firestone Tire and Rubber Co., Akron, celebrated his 42nd wedding anniversary on November 20. A quiet family dinner marked the occasion.

SHELBY M. JETT, secretary, B. F. Goodrich Co., Akron, completed 20 years of service with that company last month. He will receive his pin at ceremonies planned at the Akron Armory on December 18.

DR. J. C. PATRICK, chief chemist, Thiokol Corporation, Yardville, N. J., has written an article on "Rubber-Like Resins" which appears in the recently published Plastics Handbook issued by *Modern Plastics*, trade magazine.

H. E. SIMMONS, president of Akron University, and widely known in the rubber industry for his work in connection with the Rubber Division, A.C.S., has been re-named county chairman for the committee arranging for President Roosevelt's annual Birthday Ball to raise funds for the fight against infantile paralysis.

MERVIN E. BARR, supervisor at Goodyear Tire and Rubber Co., Akron, is scheduled to leave for Java next month where he will take up new duties in charge of production control and stores at the Goodyear plant.

C. W. SEIBERLING, vice-president, Seiberling Rubber Co., Akron, was elected to the board of directors of the Akron Automobile Club for nine years at a meeting of the Club held on November 12. He is one of the oldest members of the organization.

C. H. HAZARD, head of the Hazard Advertising Corp., FOSTER D. SNELL, president of Foster D. Snell, Inc., and MATTHEW J. SCHIEBEL of Wishnick-Tumpeer, Inc., were among the winners of the ten second prizes offered by the Exposition of Chemical Industries for a slogan best describing the value of the chemical industry to industry in general. First prize went to NORMAN E. DIEHL of DuPont.

ROBERT S. WILSON, vice-president in charge of sales for the Goodyear Tire and Rubber Co., Akron, observed his 24th wedding anniversary last month. Executives of Goodyear participated in the celebration.

DEXTER NORTH, chief of the Chemical Division of the U. S. Tariff Commission, has resigned to become associated with Arthur D. Little, Inc., research chemists and engineers of Cambridge, Mass., as their Washington technical representative. He is a graduate of Hamilton College and of the Massachusetts Institute of Technology.

DR. THOMAS H. NORTON, on the technical staff of the American Cyanamid and Chemical Corporation since 1930, and considered an authority on synthetic resins, has been awarded the Lavoisier Medal of the Société de Chimique de France. The medal is awarded to chemists of outstanding achievement who have been members of the society for more than 50 years.

T. B. TOMKINSON, controller, B. F. Goodrich Co., Akron, was elected to the directorate of the Akron Chamber of Commerce at a meeting of the board of directors held on November 26. He replaces J. J. NEWMAN, resigned.

C. S. LINCOLN, treasurer, A. G. Spalding & Bros., has been elected secretary of the company to succeed H. BOARDMAN SPALDING, resigned. H. H. PEASE, president of the New Britain Machine Co., has been elected a director to fill the vacancy created by the resignation of E. E. COMBS, controller.

WILLIAM F. CUNNINGHAM, time study engineer of the Fisk Rubber Corporation, Chicopee Falls, Mass., has been elected president of the newly-organized Springfield (Mass.) Time Study and Methods Association. The new organization held its first annual banquet on November 23.

T-50 Test Apparatus Available

A T-50 test apparatus, a simple and practical device for evaluating and studying accelerators, designed by the Naugatuck Chemical Division of U. S. Rubber Products, Inc., in conjunction with the Henry L. Scott Co., is now being distributed by Naugatuck Chemical. This test is determined by stretching a strip of rubber about one-half to two-thirds of its breaking elongation and freezing it at a temperature of minus 50° C. to minus 70° C. so that it only slightly reacts when released. The temperature is then slowly raised and a temperature is reached at which the sample retracts rather rapidly, usually occurring over a range of only a few degrees. A complete explanation of this T-50 test by Messrs. Gibbons, Gerke and Tingey appeared in the May, 1933, issue of the *Analytical Edition* of *Industrial & Engineering Chemistry*. It has already been adopted as a standard test in several laboratories.

Texas Wyex Black

One year ago, J. M. Huber, Inc., carbon black manufacturers of New York City, introduced Wyex Black, a smooth processing black developed from a special type of natural gas indigenous to the State of Wyoming. The company now advises that it has designed a special type of production unit at its major plant in Borger, Texas, and has made available Texas Wyex Black, equal in properties to the Wyex black of Wyoming. The new black is being supplied in regular compressed and compact (granulized) form.

WILLIAM O'NEIL, president, General Tire and Rubber Co., Akron, addressed members of the Akron Real Estate Board on December 2 at a meeting held at the Mayflower Hotel in Akron.

RALPH K. GUINZBURG, president, I. B. Kleinert Rubber Co., was tendered a testimonial dinner on December 1 at the Biltmore Hotel in New York City by approximately 350 leaders in the notion and novelty trades in recognition of his business, civic and charitable activities. He is a founder of the Notions Association and was its president for two years.

F. A. PARNELL has been appointed sales manager of the Conduit and Wire Sales Division of the General Electric Company, at Bridgeport, Conn. He was formerly manager of sales promotion for the company's construction materials.

FOSTER DEE SNELL, head of the laboratory bearing his name in Brooklyn, N. Y., has been elected a vice-president of the Society of Chemical Industry of England. This is the first time since 1928 that an American has been elected as an officer of the English society.

NON-TIRE PRODUCTS IMPROVING STATUS

Rubber products other than tires now account for fully 40% of the rubber industry's activities, according to a survey recently concluded by the Standard Statistics Company of New York City. Sales of mechanical goods, footwear and other non-tire products, as a whole, declined much less than tire and tube sales during the 1929-32 period and also recovered more substantially in the past few years from the low point.

As a result of this lower decline and higher recovery, rubber products other than tires have increased from 29% of the total value in 1927 to over 40% in 1937. According to the survey, mechanical goods represent more than two-fifths of the total non-tire rubber products, footwear about one-fourth, and clothing, heels and soles less than one-tenth for each classification.

Expansion of Mechanical Goods

The survey bears out others made in recent months in that it indicates that the mechanical goods group has shown the greatest expansion in recent years. The sales value of mechanical goods, for example, was indicated to have been approximately 5% in 1936 above the previous record, attained in 1929, while the value of tires in 1936 was more than 50% below the 1926 peak. Sales of mechanical goods have increased more than 150% from the depression low point, according to the survey, and further expansion is expected.

Non-tire rubber products other than mechanical goods, however, have shown only fair recovery since 1932, the survey reveals, and for the most part are still below the value of the peak year of 1926. Heels and soles, especially, have shown slow recovery. Pointing out the large number of new developments in rubber products within recent years, the survey states that modern motor cars now use more than 200 rubber parts on the body and chassis, and that similar uses are being developed for airplanes and streamlined trains.

Price Structure Firmly Held

Standard Statistics also reports that recent tire price advances, announced in November, provide evidence that the tire price structure is being held strongly. Although the possibility of future price wars in the tire field are deemed unlikely, the statistical concern warns that "the industry's past record makes it necessary to consider the possibility of renewed price cutting over coming months."

Regarding tire sales the report has this to say: "It is estimated that replacement sales in the current quarter will do no better than approximate the 1936 volume, while original equipment shipments will decline perhaps 25% or more. Total shipments, therefore, are likely to be 10 or 15% lower in this period. For 1938, it is indicated tentatively that total shipments may decline 5 to 10%. Manufacturers' tire inventories on October 1 totaled some 11,500,000 units, compared with about 9,000,000 a year before. Distributors' stocks are estimated to have shown a small decrease."

Announce Change in Name

The Pacific Balloon Company, 3570 West 1st Street, Los Angeles, Calif., has announced a change in its corporate name to that of the Pacific States Rubber Company. No change in personnel or policies was made. The company, which distributes rubber gloves, toy balloons, household rubber products and other items, is the western branch of the Pioneer Rubber Company of Willard, Ohio. Louis S. Reed is president of the branch firm.

Introduce "Current Titles"

A new periodical termed *Current Titles*, which will list the tables of contents of the world's outstanding English language journals, as published, in the fields of chemistry, engineering, physics, geology and technology, has made its initial appearance. It is being published and edited by Arthur Cecil Stern at 928 Broadway, New York City.

Set Next Safety Congress

The executive committee of the National Safety Council, 20 North Wacker Drive, Chicago, Illinois, has announced that the 1938 National Safety Congress will be held at the Stevens Hotel in Chicago on October 10 to 14. More than 200 sessions and approximately 400 speakers are planned. 1938 marks the silver jubilee of the Council.

BUREAU DISCREDITS POINSETTIA CLAIMS

Extravagant claims as to the possibilities of extracting rubber from the Christmas plant, known as *Euphorbia pulcherrima* and commonly called poinsettia, have been discredited by studies conducted by both the United States Department of Agriculture and independent investigators. The studies are reported to indicate that there is not a sufficiently high rubber content in the plant, which is native to Mexico, to warrant commercial rubber production.

According to the Department of Agriculture, it is quite easy to differentiate between the latex of poinsettia and that of the Hevea rubber tree, the most simple test being by the odor. Whereas ammonia preserves Hevea latex it coagulates the latex from poinsettia and any latex with the characteristic odor of ammonia could not be from poinsettia, the government's rubber experts point out.

Microscopically, the latex particles of poinsettia are quite different from those of Hevea, particles in the latter being oval or pear-shaped while those in poinsettia are spherical and distinctly smaller.

Circle Wire Sells Factory

The Circle Wire and Cable Corporation has sold its two-story factory containing about 100,000 square feet at 24 Woodward Avenue in Maspeth, Long Island, and has purchased a plot of more than 300,000 square feet on Maspeth Avenue where it expects to construct a new plant to contain approximately 150,000 square feet.

LOS ANGELES PLANT OF WESTERN INSULATED WIRE

The drawing above shows the new factory of Western Insulated Wire, Inc., at 1001 East 62 Street in Los Angeles, Calif. This is said to be the first plant to manufacture a complete line of all types of rubber-covered insulated wire west of Chicago. The plant has approximately 20,000 square feet of manufacturing space and is said to be equipped with the most modern type of machinery. About 40 employees will be initially put to work, according to E. H. Lewis, vice-president of the company. Mr. Lewis was at one time designing engineer in charge of wire and cable for General Electric and also served as general manager of the Hatfield Wire and Cable Co. A. D. Nast, Jr., is president of the new firm.

Obituaries

Stanley Krall

Stanley Krall, Manager of the Product Development Department of the Fisk Rubber Corporation, Chicopee Falls, Mass., and one-time chairman of the Rubber Division, A.C.S., died suddenly

at his home, 33 Benedict Terrace, Longmeadow, Mass., on November 22, 1937. He had been in poor health for some time. He was 43 years of age at the time of his death. Mr. Krall was born in Detroit but received his early education in the public schools of Cleveland where his family moved when he was still a child. He later attended the Case School of Applied Science, being graduated in 1916 with a B.S. degree in chemistry. Immediately after being graduated he was employed in the laboratories of the Firestone Tire and Rubber Company and remained there until 1924 when he resigned to accept a position as chief chemist for the Mason Tire and Rubber Company, serving in that capacity for two years. Mr. Krall became associated with Fisk late in 1925, was advanced to manager of the compound division of the Product Development Department in 1927, and was made manager of that department in February, 1936, continuing in that capacity until his demise. An active member of the Rubber Division, A.C.S., he also participated in the affairs of the American Society for Testing Materials, the Society of Automotive Engineers, and the Tire and Rim Association. Keenly interested in outdoor sports he was a member of the Springfield Country Club and the Appalachian Mountain Club. He was also a member of the Springfield Lodge of Masons and of the Fisk Craftsman's Club. Funeral services were held in Springfield, Mass., on November 25. Mr. Krall is survived by his mother, wife, daughter and two sons.

Manley E. Chester

Manley Earle Chester, a founder and for many years general manager of the Whitney Blake Company, New Haven, Conn., manufacturer of rubber insulated wire largely for telephone and telegraph use, died at his home, Cherry Hill, Hamden, Conn., on November 17, at the age of 61. Born in Champaign, Illinois, in 1876, Mr. Chester was graduated from the University of Illinois in 1897. Upon being graduated, he joined the Western Electric Company as a telephone engineer and remained with that concern until 1910. The Whitney Blake Company was incorporated in 1912 and Mr. Chester served as secretary and director until 1919 when he was elevated to the post of general manager. He occupied this position until his retirement from active business in 1932. Mr. Chester held memberships in the Quinnipiack, Lawn, Graduates, Rotary, Madison and other clubs. He was also a member of the New Haven Colony Historical Society, Neighborhood House Council and Children's Center, and was a trustee of the Connecticut Savings Bank. Mr. Chester leaves a widow and three children.

V. C. Carr

V. C. Carr, a member of the Akron advertising department of the B. F. Goodrich Company since April, 1934, died in his sleep at his home, 148 Adaline Drive, Stow, Ohio, on December 2. He had been in failing health lately. Mr. Carr, a native of Roxbury, Mass., was graduated from Boston College and took a post-graduate course at Massachusetts State University. In 1926 he joined the sales promotion staff of the Boston office of Goodrich, later becoming advertising manager of that office. In 1934 he joined the Akron advertising staff. He leaves a widow and three children. Burial was in Boston.

Martha Dunphy

Miss Martha Dunphy, secretary of the C. P. Hall Company, Akron, Ohio, and well known to many members of the rubber industry, died on November 25 at the St. Thomas Hospital in Akron following a two weeks' illness. An active member of the Catholic Daughters of America and the Ladies' Catholic Benevolent Association, Miss Dunphy was also well known in downtown Akron business circles. She was also a member of the Altar Society of St. Vincent's Church. Funeral services were held on November 29 with interment in St. Vincent's Cemetery. She leaves a mother, brother and two sisters.

Jules H. Michelin

Jules Hauvette Michelin, vice-president and general manager of the Michelin Tire Company, died at his home in Chamalieres, France, on December 2 at the age of 56. Michelin operates tire factories in France and Italy, and up until 1930 operated one at Milltown, N. J. The American factory was closed after running for twenty-three years because of merchandising conditions in the industry. While in this country, Mr. Michelin lived in New Brunswick, N. J. Two months before the Milltown plant was closed he offered to pay bonuses aggregating $700,000 to approximately 700 of his 1,800 employees, who had been laid off because of business conditions. These employees were given the option of accepting the bonuses outright or leaving them in the hands of the company for a three-year period at 5% interest. The Milltown plant was long considered an industrial model. Among his many inventions, Mr. Michelin perfected a pneumatic-tired railroad car, a demonstration of which was given in this country in 1932. These cars are widely used in European countries although they have not been adopted in the United States as yet. Mr. Michelin was the nephew of Edouard Michelin and the late André Michelin, who are credited by France with having invented pneumatic automobile tires.

John H. Connor

John H. Connor, senior vice-president, director and manager of foreign affairs for the United Shoe Machinery Corporation, died on November 22 in the American Hospital at Paris, France, at the age of 83. Mr. Connor, who lived at West Newton, Mass., and had a summer home at Rye, N. H., had made more than 170 trans-Atlantic voyages. He leaves a widow, a son and a daughter.

Warn Sears-Roebuck

According to a letter received by George J. Burger, secretary and general manager of the National Association of Independent Tire Dealers, Inc., the United States Treasury has warned Sears, Roebuck & Company, mail order chain, to desist from capitalizing on its recent government contract for tires. After receiving identical bids from several rubber manufacturers, the Treasury Department negotiated and completed a tire contract with Sears-Roebuck. Following receipt of this contract, several of the mail order chain's retail establishments openly advertised the fact, which is contrary to government regulations. The Treasury Department also advised, however, that Sears-Roebuck has taken steps to correct this condition. Mr. Burger recently indicated that his association would make every effort to have the government cancel its contract with Sears-Roebuck on the ground that it was unfair to the country's tire dealers

NEW TIRE WARRANTY ADOPTED BY TRADE

Leading tire manufacturers and several of the smaller producers have adopted a new tire warranty, given the purchaser in the form of a certificate, to replace the former "road hazard guarantee" which was believed to have cost the tire manufacturers millions of dollars annually in unfair claims. The new warranty is said to be a cross between the former guarantee offered by the tire producers and the liberal ones granted by the mail order houses and oil companies handling private-brand tires.

The terms of the new warranty follow: "Every tire of our manufacture, bearing our name and serial number, is guaranteed by us to be free from defects in workmanship and material, without limit as to time or mileage and to give satisfactory service under normal operating conditions. If our examination shows that any tire has failed under the terms of this guarantee, we will either repair the tire or make an allowance on the purchase of a new tire."

Although the new warranty has not been broadened legally, the wording has been changed from intricate legal phraseology to layman's language, thus giving the purchaser a clearer understanding of the guarantee and strengthening the competitive position of the tire manufacturers. It is hoped that adoption of the new warranty will cut down the number of unjustified repairs or returns.

CHEMICAL SHOW HELD IN NEW YORK

Three entire floors of the Grand Central Palace in New York City were occupied by exhibits in the 16th Exposition of Chemical Industries held on December 6 to 11. Products on view ranged from chemicals to heavy machinery and exhibitors reported satisfaction with the attendance and interest aroused. Several rubber manufacturers, including the American Hard Rubber, Luzerne Rubber and Garlock Packing companies, exhibited their products designed for use in the chemical and allied industries. Maurice A. Knight also exhibited the rubber drums developed by General Tire and Rubber Company, for which he is sole distributor.

Five rubber chemicals introduced in the past two years were included in the "Children of Prosperity" exhibit sponsored by the American Chemical Society. These included three developed by Monsanto, *i. e.*, Santomerse, new wetting agent; Santoflex B, an antioxidant; and El-Sixty, an accelerator for high clay stocks; and two developed by DuPont — R. P. A. No. 2, a peptizing agent, and Monastral Fast Blue BS, a new pigment. DuPont's "Cordura" rayon yarn for tire cords was also included in this special exhibit.

Machinery manufacturers exhibiting at the show, with products on view of interest to the rubber industry, included the following: Abbe Engineering Co. (ball and pebble mills); Atlas Electric Devices Co. (weather and sun testing instruments); Baker-Perkins Co. (mixers); Barnstead Still & Sterilizer Co. (emulsifiers); Chemicolloid Laboratories (colloid mills); Premier Mill Corp. (colloid mills); Sharples Specialty Co. (ultra-centrifuge machine); Sprout, Waldron & Co. (rotary knife cutters); and the Standard Machinery Co. (hydraulic presses).

Companies showing full lines of indicating, recording and controlling instruments included the Bristol Co., Foxboro Co., Illinois Testing Laboratories, Leeds and Northrup Co., C. J. Tagliabue Mfg. Co., and the Taylor Instrument Companies. Chemical companies exhibiting products of interest to the rubber industry included Hercules Powder Company, exhibiting finishes made with chlorinated rubber; Neville Co., displaying its full line of synthetic resins and coal-tar by-products; and Wishnick-Tumpeer, Inc., which in addition to showing its line of chemical materials also featured a miniature industrial movie.

Settle Goodyear Difficulty

In protest against 1,600 layoffs by the Goodyear Tire and Rubber Company, workers staged a sit-down strike in mid-November which resulted in the Akron plants being shut down for three days. An agreement was quickly reached between the Goodyear local of the United Rubber Workers of America and the management, however, and the plants were quickly re-opened. During the short three-day protest, Governor Davey of Ohio ordered 2,000 National Guardsmen to "stand by" for possible duty. The six-week strike at the Bowling Green Rubber Company's plant at Toledo, Ohio, was also settled on November 16 when a contract, the terms of which were not made public, was entered into between the union and the management. The contract runs until December 31, 1938. Settlement of this strike was said to have been held up by the union's insistence that a public accountant be permitted to inspect the books of the company to determine whether it could afford to give the workers a specified wage increase, a point firmly resisted by the company.

LOS ANGELES NEWS

The Waynway Rubber Manufacturing Company, 2248 East 37th Street, has completed enlargement of its plant. The sponge rubber department has been put in shape for larger production while the plant is now branching out extensively in the business of rubber coating exhaust fans, developing trays and other photographing equipment for moving picture studios. Manufacture of rubber parts for vacuum brake linings is also another new activity of the company. A new store building has been leased for warehouse purposes and Art Wayne, junior member of the firm, reports business on the upgrade. The company has found it necessary to employ a superintendent, releasing Mr. Wayne for sales work and promotions on the outside. Clark Tyler, formerly superintendent for the Universal Rubber Corporation at San Francisco, is the new superintendent. Mr. Clark held the San Francisco position for four years and prior to that was employed by the W. J. Voit Rubber Corporation at Los Angeles for three years.

W. R. Hucks, technical compounder for the B. F. Goodrich Company, Pacific Division, is back at his duties at the Los Angeles plant after two extensive trips to the east. The last absence, covering a month, was spent in Akron, Ohio, where he took part in technical conferences. Prior to that he had spent six months assisting with the establishment of the company's new tire plant at Oaks, Pennsylvania.

Charles A. Lamb, vice-president of the West American Rubber Company, who has been seriously ill for a few weeks, is back again on the job.

Western Insulated Wire, Inc., 1001 East 62nd Street, Los Angeles, began operations on December 8. The plant has been in process of installation for three months. E. H. Lewis, vice-president and general manager, states that all sizes of rubber-covered insulated wire is to be manufactured and the employment of about 40 men as a starter is anticipated. About 20,000 feet of floor space is occupied. Sales will be made largely through manufacturers' representatives and distribution throughout the whole western section of the United States.

The W. J. Voit Rubber Corporation and the Voit Company, Inc., were merged during the past month into one corporation with all executive offices at 2616 Nevin Avenue. W. J. Voit is president of the company as it now stands and Willard D. Voit, his son, who has headed the Voit Company, Inc., is comptroller.

The Olympic Rubber Company, 1860 East Gage Avenue, has completed a new, stucco-finish office building, 30 by 75 feet in dimensions, one story. The building houses four office rooms. Fred Praul, co-partner of the company, reports good business. The company manufactures a general line of mechanical rubber goods.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, DECEMBER 9, 1937

Crude Rubber

ERRATIC foreign markets and weaker securities dominated actuals and futures in the rubber market in mid-November with the result that prices declined almost daily. Lack of dealer and factory buying contributed to this trend, the trade awaiting the action of the International Rubber Regulation Committee on next year's quota allotments. Increasing resistance of traders to press the selling side of the market in view of this approaching action resulted in turning the price upward in the last few days of November. Following the meeting of the Restriction Committee in London on November 30, at which quotas were set at 70% of probable production for the first quarter of 1938, the price jumped sharply from 14.44 on November 29 to 15.25 on the Exchange. Lack of factory buying brought the price down to 14.96 on December 1 but since that date there has been some factory interest with the result that prices have been moving upward in the past few days, reaching 15.56 today (December 9). Quotations in the outside market, Exchange, London and Singapore, follow:

As of December 9

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.15 5/8
January-March	—	@	.15 11/32
April-June	—	@	.15 11/32
No. 2	—	@	.15¼
No. 3	—	@	.14 13/16
No. 4	—	@	.14 5/8
Thin Latex Crepe	—	@	.15 11/32
Thick Latex Crepe	—	@	.15 11/32
Brown Crepe, No. 1	—	@	.14 1/8
Brown Crepe, No. 2	—	@	.14 7/16
Amber Crepe, No. 2	—	@	.14 1/4
Amber Crepe, No. 3	—	@	.14 3/16
Amber Crepe, No. 4	—	@	.13 13/16
Brown Crepe, Rolled	—	@	.11 1/4

Latex—

Liquid Latex, per gal.	.57	@	.58

Paras—

Up-River, fine	—	@	.15¼
Acre Bolivian, fine	—	@	.15¼

Balata—

Surinam sheet	.35	@	.36

LONDON MARKET

Standard Smoked Sheets—Buyers—December 9

January-March	—	@	7 5/8d
April-June	—	@	7 11/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—December 9

January-March	—	@	7¼d
April-June	—	@	7 3/16d

Reclaimed Rubber

Prices on several grades of reclaim, particularly on tube stocks, have dropped since our last report. The price on No. 1 (floating) tube stock has dropped 4½ cents. Reclaimers report fewer demands for this grade which is intended mostly for export. Although business has fallen off somewhat in the past month reclaimers look for a return to activity within the early future. Current quotations follow:

Shoe

Unwashed ....lbs.	.07	@	.07¼
Washed ....lb.	.10	@	.10½

Tube

No. 1 (Floating) ....lb.	.14½	@	.15
No. 2 (Compounded) ....lb.	.09	@	.09½
Red tube ....lb.	.09	@	.09½

Tires

Black (acid process) ....lb.	.07¼	@	.07½
Black, selected tires ....lb.	.06¼	@	.06½
Dark Gray ....lb.	.09¾	@	.10
White ....lb.	.13	@	.13½
Truck, Heavy Gravity ....lb.	.06	@	.06½
Truck, Light Gravity ....lb.	.07½	@	.08

Miscellaneous

Mechanical blends ....lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Scrap rubber dealers report a quiet market with little interest from reclaimers. Some stocks are tightening up due to scarcity of supply due in turn to the recent bad weather and low prices. Prices have dropped slightly on auto tire peelings and inner tube (No. 2) stocks. Optimism is expressed for the early future. Current quotations follow:

(Prices to Consumers)

Auto tire peelings ....ton	19.00	@	20.00
Mixed auto ....ton	13.50	@	14.00
Beadless tires ....ton	17.50	@	18.00
Clean solid truck tires ....ton	27.00	@	29.00
Boots and shoes ....ton	17.50	@	20.00
Arctics, untrimmed ....ton	16.00	@	18.00
Inner tubes, No. 1 ....lb.	.10	@	.11
Inner tubes, No. 2 ....lb.	.04½	@	.04¾
Inner tubes, Red ....lb.	.04½	@	.04 5/8

Cotton

Cotton prices have moved in a narrow range since our last report, high for the period being 8.22 on November 27 and low 7.83 on November 18. Liquidation of the December position provided most of the activity and a good percentage of the contracts in recent sessions of the cotton market. Traders are carefully watching Congressional action on the Farm Bill. Senatorial committees seem to be considerably perplexed in concocting a measure which will take care of the numerous ramifications of the farm problem. Pending completion of this bill, the cotton market is expected to continue dull and uninteresting unless some new trading incentive appears. The first report of the Commodity Exchange Administration early this month revealed that there were 3,746,000 bales open in New York and New Orleans which is less than the amount controlled by the Government. This disparity is expected to increase further as cotton seems to be going into loan at a much faster rate than it is coming to market. Quotations for middling uplands on the Exchange follow:

	Nov. 9	December 9		
	Close	High	Low	Close
December	7.85	8.07	7.93	8.07
January	7.85	8.10	7.95	8.07
March	7.89	8.14	8.02	8.10

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3 ....lb.	.28¼	@	.28½
Peeler, carded, 23/4/3 ....lb.	.29¼	@	.29½
Peeler, carded, 15/3/3 ....lb.	.26¼	@	.26½
Peeler, carded, 13/3/3 ....lb.	.25¼	@	.25½
Egyptian, carded, 23/5/3 ....lb.	.42	@	.42¼
Egyptian, combed, 23/5/3 ....lb.	.47	@	.47½
CHAFERS			
Carded, American, 1 1/16" ....lb.	.28½	@	.29
Carded, American, 1" ....lb.	.22	@	.26

Sheetings

48x40	36 in.	5.50	....lb.	— @	.03½
40x40	36 in.	6.15	....lb.	— @	.03¼
40x36	36 in.	6.50	....lb.	— @	.03
48x48	40 in.	2.50	....lb.	— @	.07¾
48x48	40 in.	2.85	....lb.	— @	.06 5/8
56x60	40 in.	3.60	....lb.	— @	.06 3/8
48x44	40 in.	3.75	....lb.	— @	.05¼
44x40	40 in.	4.25	....lb.	— @	.05 1/8

Ducks

Enameling (single filling) ....lb.	.21	@	.23½
Belting and Hose ....lb.	.25	@	—
Single filling, A grade ....lb.	.10¼	@	.12½
Double filling ....lb.	.11¼	@	.13

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM NOVEMBER 10 TO DECEMBER 9

Date	Spot	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Sales
Nov. 10	15.00	14.99	15.01	15.09	15.14	15.17	15.25	15.30	15.34	15.37	15.41	15.44	15.47	——	572
11															
12	15.12	15.10	15.12	15.20	15.27	15.34	15.39	15.43	15.46	15.50	15.53	15.57	15.60	——	499
13	14.75	14.75	14.77	14.85	14.92	15.00	15.06	15.12	15.15	15.19	15.22	15.26	15.29	——	175
14															
15	14.68	14.65	14.67	14.75	14.82	14.89	14.95	15.00	15.05	15.10	15.13	15.16	15.19	——	263
16	14.38	14.38	14.40	14.48	14.54	14.59	14.66	14.73	14.78	14.82	14.86	14.90	14.94	——	254
17	14.48	14.46	14.48	14.58	14.64	14.70	14.76	14.82	14.87	14.93	14.97	15.01	15.05	——	144
18	14.56	14.55	14.56	14.67	14.73	14.80	14.85	14.91	14.94	14.98	15.02	15.06	15.10	——	234
19	14.31	14.32	14.34	14.40	14.45	14.51	14.56	14.61	14.65	14.69	14.72	14.76	14.80	——	279
20	14.15	14.13	14.15	14.20	14.27	14.34	14.39	14.43	14.46	14.50	14.53	14.57	14.63	——	435
21															
22	14.03	14.02	14.04	14.15	14.20	14.25	14.30	14.35	14.40	14.44	14.49	14.54	14.59	——	269
23	14.44	14.38	14.40	14.46	14.53	14.60	14.65	14.70	14.77	14.86	14.90	14.95	15.00	——	189
24	14.63	14.60	14.60	14.69	14.74	14.78	14.85	14.90	14.95	15.00	15.05	15.09	15.14	——	299
25															
26	14.60	——	14.62	14.71	14.78	14.85	14.90	14.94	15.00	15.07	15.11	15.15	15.20	——	200
27	14.56	——	14.57	14.66	14.72	14.76	14.83	14.89	14.95	15.02	15.07	15.12	15.17	——	149
28															
29	14.44	——	14.46	14.55	14.64	14.70	14.78	14.83	14.90	14.97	15.02	15.07	15.14	——	574
30	15.25	——	15.30	15.39	15.46	15.50	15.60	15.62	15.74	15.78	15.81	15.82	15.89	——	669
Dec. 1	14.96	——	15.00	15.09	15.20	15.32	15.36	15.41	15.45	15.51	15.56	15.61	15.67	15.73	240
2	15.00	——	15.03	15.13	15.23	15.32	15.40	15.47	15.52	15.57	15.62	15.67	15.72	15.77	263
3	15.50	——	15.52	15.62	15.70	15.78	15.84	15.87	15.93	15.98	16.03	16.08	16.13	16.18	357
4	15.50	——	15.50	15.59	15.66	15.74	15.81	15.88	15.94	16.00	16.05	16.10	16.15	16.20	113
5															
6	15.31	——	15.31	15.40	15.47	15.55	15.62	15.65	15.73	15.75	15.84	15.89	15.94	15.99	181
7	15.21	——	15.21	15.30	15.37	15.45	15.51	15.58	15.61	15.65	15.70	15.75	15.80	15.85	176
8	15.28	——	15.27	15.36	15.43	15.51	15.57	15.63	15.69	15.75	15.80	15.85	15.90	15.95	122
9	15.56	——	15.58	15.67	15.74	15.82	15.88	15.93	15.97	16.00	16.05	16.10	16.15	16.20	273

Rubber CHEMICAL Markets

NEW YORK, DECEMBER 10, 1937 [All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.26 @	—
A-5-10	lb.	.34 @	—
A-11	lb.	.57 @	—
A-19	lb.	.57 @	—
A-32	lb.	.72 @	—
A-77	lb.	.47 @	—
A-100	lb.	.47 @	—
A-433	lb.	50 @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	— @	—
Captax	lb.	— @	—
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.47
Diphenylguanidine	lb.	.35 @	.37
El-Sixty	lb.	.57 @	—
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.45 @	—
Heptene	lb.	.40 @	—
Hexamethylenetetramine	lb.	.36 @	—
Lead Oleate, No. 999	lb.	.12 @	—
Witco	lb.	.12 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	—
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.75 @	—
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.65 @	—
R-23	lb.	.57 @	—
Satex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.26 @	—
Trumene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.65 @	—
Ureka Blend B	lb.	.65 @	—
Ureka C	lb.	.60 @	—
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.51 @	—
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.07¼ @	—
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb.	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.48 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05⅞ @	.06⅛
Cryptone CB, No. 21	lb.	.05⅞ @	.06⅛
Cryptone, ZS-20	lb.	.09 @	.09¼
Cryptone, ZS-86	lb.	.09 @	.09½
Lithopone			
Albalith, black label—11	lb.	.04⅜ @	.04⅝
Azolith	lb.	.04⅜ @	.04⅝
Rayox	lb.		
Titanox A	lb.	.16 @	.16¾
Titanox B	lb.	.05⅞ @	.06⅛
Titanox C	lb.	.05⅞ @	.06⅛
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06½ @	.06¾
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U S. P.—7, bbls.	lb.	.09 @	.09¼
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.61 @	—
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0435 @	.0775
Bone, powdered	lb.	.05½ @	.12
Carbon, compressed	lb.	.0435 @	.0775
uncompressed	lb.	.0435 @	.0775
"Certified"	lb.	.0410 @	.0775
Spherons	lb.	.0410 @	.0775
"Disperso"	lb.	.0435 @	.0775
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0435 @	.0775
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0435 @	.0775
"Supreme"	lb.	.0435 @	.0775
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0435 @	.0775

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00	@15.00
Barium carbonate (98-100%)	ton	56.50	@62.50
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65	@31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00	@65.00
Calcene	ton	37.50	@45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40	@60.00
heavy	ton	45.00	@55.00
Clay, Kaolin, domestic	ton	7.50	@15.00
Aerfloted, Suprex	ton	9.00	@21.00
Congaree	ton	9.00 @	—
Crown (f.o.b. plant)	ton	9.00 @	—
Dixie	ton		
Dixie, Jr.	ton		
McNamee	ton		
Par	ton		
Tensulite	ton	15.00 @	—
Witco	ton	8.50 @	9.00
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00	@55.00
Kalite No. 3	ton	40.00	@65.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07 @	.09
Mica	ton	35.00	@44.00
Pyrax A	ton	— @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00	@22.00
Starch, powdered	cwt.	2.90	@ 4.10
Talc, domestic	ton	17.00	@20.00
Whiting, commercial	ton	17.00	@18.00
Columbia Filler	ton	9.00	@14.00
English Cliffstone	ton	33.00	@43.00
Witco	ton	7.00 @	—
Wood Flour	ton	20.00	@25.00
Zinc Carbonate	lb.	— @	.11½
Zinc Stearate	lb.	— @	.27

MINERAL RUBBER

Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00	@27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo	lb.		
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40 @	—
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13 @	—
Suntroot	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.80
Tackol (tackifier)	lb.	.115 @	—
Tonox	lb.	.56 @	.60

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53	@ 2.78
Nitric, 36 degrees	cwt.	5.00	@ 6.00
Sulfuric, 66 degrees	ton	15.50	@16.50
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex Beads	lb.	.10¾ @	.11¾
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	.11¾
Alkalies			
Caustic Soda, 76%	cwt.	3.05 @	4.25
Soda Ash, 58%, C.L.	cwt.	1.25 @	3.05
Oils			
Cycline Oil	gal.	.20 @	—
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03½ @	.03⅝
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
dest. dist., drums	gal.	.49 @	.50
Rosin Oil, cmpd	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00	@26.00
Solvents			
Acetone, pure	lb.	.06 @	.06½
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	lb.	.05¾ @	.08¼
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	gal.	.41 @	.50
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.		
Reogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.09½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol H	lb.	.54 @	—
Flectol White	lb.	1.00 @	—
Flectol B	lb.	.54 @	—
Neozone	lb.		
Oxynone	lb.	.68 @	—
Perflectol	lb.	.67 @	.75
Retardex	lb.	.35 @	.40
Santoflex A	lb.	— @	—
Santoflex B	lb.	.54 @	—
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mold Paste	lb.	.18 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.25 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.20 @	—
Black	lb.	.07¾ @	.13½
White	lb.	.095 @	.15
Brown	lb.	.095 @	.14
Neophax	lb.	.13 @	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.04½ @	—
Sulfur flour.			
Refined, 100% pure (bags)	cwt.	2.55 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.		
Vandex	lb.		

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1936:							
Mar.*	33,447	9,845,776	13.14	1,172	390,551	14.88	32,275
Apr.*	44,218	13,967,712	14.10	984	343,785	15.59	43,234
May*	35,578	11,460,157	14.38	1,589	580,021	16.30	33,989
June	36,376	12,073,632	14.82	2,469	904,669	16.35	33,907
July	38,178	12,763,200	14.92	1,383	510,075	16.47	36,795
Aug.	40,027	13,364,916	14.91	840	307,114	16.32	39,187
Sept.*	48,368	16,691,919	15.41	656	244,554	16.64	47,712
Oct.	39,573	13,627,465	15.37	778	268,645	15.42	38,795
Nov.*	36,798	12,790,306	15.52	675	241,982	15.99	36,123
Dec.	49,312	17,555,705	15.89	677	267,745	17.65	48,635
1937:							
Jan.	42,002	15,408,242	16.38	844	372,053	19.69	41,158
Feb.	42,743	16,470,867	17.20	523	236,853	20.21	42,220
Mar.	38,682	16,030,267	18.50	1,146	522,931	20.37	37,536
Apr.	41,275	17,859,223	19.31	1,050	415,484	17.66	40,225
May	46,902	22,163,440	21.10	528	270,499	21.08	46,374
June	47,073	22,559,545	21.39	807	390,542	21.60	46,266
July	41,493	19,010,273	20.45	767	300,301	17.48	40,726
Aug.	48,020	20,595,314	19.15	670	265,298	17.69	47,350
Sept.	55,123	22,119,248	17.91	668	280,741	18.76	54,455
Oct.	51,171	20,250,893	17.67	450	172,466	17.13	50,721

* Revised

Note: Annual figures for 1922-1936 revised on basis of information received on February 8, 1937. Figures for 1922 and 1923 include latex; guayule is included only in 1922.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1936:								
Oct.	114	31,489	11	4,815	452	102,485	1,392	500,817
Nov.	159	43,980	43	19,408	405	91,538	1,631	578,729
Dec.	134	36,972	14	7,247	538	109,208	2,070	735,156
1937:								
Jan.	160	44,166	10	4,348	247	56,056	1,337	535,546
Feb.	206	56,807	14	5,838	242	61,741	1,973	775,202
Mar.	136	37,453	29	13,949	898	187,413	2,216	968,053
Apr.	190	52,361	3	1,457	617	135,412	1,633	724,757
May	182	50,093	75	33,881	642	145,618	1,995	941,235
June	147	39,941	91	41,481	488	135,468	2,561	1,253,370
July	371	106,360	22	9,363	533	158,998	1,921	924,127
Aug.	335	95,893	16	5,876	363	107,611	1,801	838,778
Sept.	329	90,822	5	2,196	701	214,511	1,901	839,159
Oct.	247	68,178	29	12,090	460	149,516	1,958	844,205

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)
(All Quantities in Long Tons)

	Figures on Monthly Basis: 1930	1931	1932	1933	1934	1935	1936*	1937
Jan.	36,194	28,557	29,648	22,645*	39,190*	46,636*	48,631	50,818*
Feb.	33,302	28,797	31,821	21,392*	40,515*	42,720*	36,841	51,887*
Mar.	35,540	32,788	29,505	17,483*	47,003*	42,153*	42,813	54,064*
Apr.	39,686	33,321	27,518	25,928	44,853*	44,247*	52,031	51,797
May	39,386	37,817	30,957	44,074	42,918*	41,101*	50,612	51,733
June	34,195	37,916	41,475	50,743*	40,147*	36,156*	52,772	51,798
July	29,508	31,397	29,976	49,614*	32,553*	35,917*	48,250	43,650
Aug.	30,850	27,586	23,721	44,428*	33,216*	38,775*	46,777	41,456
Sept.	25,515	23,638	23,847	35,281*	30,258*	37,086*	46,449	43,893
Oct.	27,516	22,277	22,286	31,543*	31,253*	41,969*	49,637	38,707
Nov.	23,691	22,943	23,231	28,831*	34,748*	42,310*	50,433	.....
Dec.	21,687	21,409	18,015	28,757*	36,569*	42,474*	49,754	.....
Tot.	375,980	348,986	332,000	400,719*	453,223*	491,544*	575,000	.....

* Revised.

Note: Figures for 1936 were revised on May 15, 1937, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]
1927	189,144	178,471	47.6	24,980
1928	208,516	223,000	50.4	24,785
1929	218,954	226,588	48.4	27,464
1930	157,967	153,497	40.8	22,000
1931	133,351	124,126	33.9	19,257
1932	75,608	77,504	23.4	16,354
1933	99,560	81,602	19.9	20,746
1934	110,010	100,597	22.2	23,079
1935	122,948	113,078*	23.0*	25,069
1936	150,571	141,486*	24.6*	19,000*

Figures on Monthly Basis	Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]		Production	Consumption: Tons	Consumption: % to Crude	Stocks[a]
1936*:									
Jan.	11,665	10,922	22.5	17,171	July	12,330	12,856	26.6	16,207
Feb.	10,188	8,014	21.8	18,890	Aug.	12,856	11,959	25.6	16,487
Mar.	10,712	9,539	22.3	19,472	Sept.	12,959	12,153	26.2	16,711
Apr.	11,382	11,241	21.6	19,024	Oct.	14,737	13,715	27.6	17,141
May	11,512	11,311	22.3	18,590	Nov.	14,357	13,087	25.9	17,900
June	11,935	12,563	23.8	17,366	Dec.	15,938	14,126	28.4	19,000
1937:									
Jan.*	15,129	14,450	28.4	18,822	July	17,885	11,924	27.3	16,646
Feb.*	15,192	14,578	28.1	18,490	Aug.	15,289	14,670	35.4	18,299
Mar.*	14,462	15,601	28.9	16,450	Sept.	16,410	13,681	37.4	21,597
Apr.	13,884	15,607	30.1	14,046	Oct.	15,849	12,234	31.6	23,572
May	15,793	14,693	28.4	14,647	Nov.	.....	.....	...	...
June	16,052	14,414	27.8	14,535	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.
* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1935	1936	1937		1935	1936	1937
January	28,147*	32,412*	33,696	August	43,097*	46,081	49,597
February	26,580*	27,216*	32,000	September	37,976*	44,346	47,245
March	32,272*	35,871	40,561	October	41,566*	44,253	45,361
April	36,363*	38,825	43,409	November	35,991*	39,919	.....
May	39,381*	42,007	45,484	December	33,872*	39,393	.....
June	38,086*	44,630	48,580				
July	41,479*	46,638*	50,929	Total	434,810*	481,591	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,098
1937:		1937:		1937:	
January ...	2,123,723	May	2,189,502	September .	1,470,472
February ..	2,022,258	June	2,141,810	October ...	1,890,082
March	2,166,218	July	1,702,105	November ..	1,818,169
April	2,269,680	August	1,342,945	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1935																																
August	12⅞	12¾			12¾	12⅞	11⅞		13⅜			12⅞	11⅞	11⅞		11⅞				11⅞			12⅞	12		12	11⅞	11⅞	11⅞	11⅞			12
September		11⅝	11⅝	11⅝	11⅝	11⅞	11⅞	12	12¼	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝	11⅝		11½
October	11⅝	11⅝	11⅝	12	12⅛	12⅛	12⅛	12¼	12¼	12⅛	12⅛	12⅛	12⅛	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	12⅜	13⅛	13⅛	13⅛	13⅛	12⅝
November	13¼	13⅛	13⅛	13⅛	13⅛	13⅛	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜
December	13¼	13⅛	13⅛	12⅞	13	13⅛	13⅜	13⅜	13	13	13	13	13	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜		13⅜
1936																																
January	13½	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	13⅜	14	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛
February	15⅛	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜	15⅜		15⅜
March	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
April	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
May	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
June	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Aug.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛	17⅛
Dec.	18½	18½	18½	19	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19	19	19	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
1937																																
Jan.		21	21⅛	20⅞	20⅝	21⅛	21⅛	21⅛	22⅛	22⅛	22⅝	22⅞	22	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	20⅛	20⅛	20⅝	20⅝	20⅝	20⅝	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅜
Feb.		21	21⅛	21⅜	21⅜	21½	21½	21½	21¾	21¾	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	23⅜	24⅛	24⅜	23	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜		24⅜
Mar.		21	21⅛	21⅛	22⅛	22⅛	24⅛	24⅛	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝	23⅝		23⅝
April		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
May		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
June		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
July		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
Aug.		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
Sept.		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
Oct.		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
Nov.		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛
Dec.		20⅞	20⅞	20⅞	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛		21⅛

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35	21.37
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48	21.33
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89	24.09
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98	23.44
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62	21.14
June	12.45	6.35	2.66	6.15	13.51	12.57	15.85	19.29
July	11.24	6.37	2.89	8.01	14.60	12.10	16.49	18.86
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	16.25	18.37
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	16.46	18.55
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	16.55	16.28
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	17.97	14.60
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	20.01	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	16.41	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1937 Sept.	1937 Oct.	1937 Nov.	1937 Dec.	Day	1937 Sept.	1937 Oct.	1937 Nov.	1937 Dec.
1	8⅞	8⅛	7⅛	7⅛	17	9	—	7	
2	8⅛	8⅜	7⅜	7⅛	18	—	7⅝	7⅛	
3	8⅛	—	7⅛	7⅛	19	—	7⅛	6⅞	
4	—	8⅛	7⅛	7¼	20	8⅞	7⅝	6⅛	
5	—	8⅛	7⅛	—	21	8⅛	7⅝	—	
6	8⅛	7⅛	7⅛	7½	22	8⅞	7⅛	6¾	
7	9⅛	8	—	7⅜	23	8⅞	7⅛	6⅞	
8	9⅛	8⅛	6⅛	7⅜	24	8¾	—	7⅛	
9	9¼	8⅛	6⅞	7½	25	—	7⅝	7⅛	
10	9⅛	—	7⅛	—	26	—	7⅛	7⅛	
11	—	8	—		27	8⅛	7¼	7⅛	
12	—	7⅞	7⅛		28	8¾	7⅛	—	
13	9⅛	7⅞	7¼		29	8½	7½	7⅛	
14	9⅞	8⅛	—		30	8⅜	7⅝	7⅛	
15	9	7⅛	7⅛		31	—	—	—	
16	8⅛	7⅛	7						

Average Monthly Price Per Pound

Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence	Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence
Jan.	4.429	6.434	6.758	10.378	Aug.	7.401	5.696	7.581	8.830
Feb.	4.920	6.292	7.255	10.503	Sept.	7.409	5.508	7.577	8.935
Mar.	5.136	5.745	7.450	11.766	Oct.	6.806	6.130	7.898	7.855
Apr.	5.712	5.604	7.502	11.471	Nov.	6.294	6.308	8.572	7.080
May	6.207	5.822	7.335	10.250	Dec.	6.295	6.340	9.580	
June	6.245	6.027	7.352	9.548	Average for Year	6.159	5.976	7.713	
July	7.053	5.801	7.696	9.136					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1937 Oct.	1937 Nov.	1937 Dec.	Date	1937 Oct.	1937 Nov.	1937 Dec.	Date	1937 Oct.	1937 Nov.	1937 Dec.
1	8.55	8.03	8.00	11	8.33	—		22	8.49	7.90	
2	8.47	—	8.06	12	—	8.13		23	8.34	7.99	
3	—	7.81	8.08	13	8.78	8.00		24	—	7.99	
4	8.48	7.79	8.01	14	8.58	—		25	8.34	—	
5	8.45	7.89	—	15	8.56	7.93		26	8.33	8.12	
6	8.35	7.85	8.03	16	8.62	7.95		27	8.33	8.22	
7	8.33	—	7.97	17	—	7.86		28	8.33	—	
8	8.05	7.97	8.08	18	8.52	7.83		29	8.32	8.10	
9	8.30	8.00	8.20	19	8.49	7.84		30	8.24	8.04	
10	—	8.01		20	8.51	7.91		31	—	—	
				21	8.52	—					

Average Monthly Price Per Pound

	1934 Cents	1935 Cents	1936 Cents	1937 Cents		1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	11.25	12.70	11.91	13.06	Aug.	13.40	11.48	12.28	10.41
Feb.	12.28	12.58	11.53	13.15	Sept.	13.00	10.80	12.31	9.02
Mar.	12.30	11.63	11.43	14.46	Oct.	12.48	11.28	12.30	8.42
Apr.	11.80	11.73	11.71	14.23	Nov.	12.53	12.01	12.23	7.96
May	11.44	12.25	11.68	13.34	Dec.	12.76	11.99	12.83	
June	12.20	11.89	12.02	12.70	Average for Year	12.36	11.88	12.11	
July	12.84	12.26	13.11	12.26					

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1935	ON HAND 1936	ON HAND 1937	AFLOAT 1935	AFLOAT 1936	AFLOAT 1937	ON HAND AND AFLOAT 1935	ON HAND AND AFLOAT 1936	ON HAND AND AFLOAT 1937
Jan.	349,446	285,054*	201,915	42,066	43,870	55,096	391,512	328,924*	257,011
Feb.	340,264	282,902*	193,864	42,969	46,532	53,538	383,233	329,434*	247,402
Mar.	340,284	276,823*	191,928*	44,485	58,935	56,994	384,769	335,758*	248,922*
Apr.	337,586	277,478*	174,934	37,651	47,678	72,530	375,237	325,156*	247,464
May	322,558	262,415*	172,985	44,375	48,860	58,542	366,933	311,275*	231,527
June	324,218	245,544*	169,646	55,581	47,228	57,215	379,799	292,782*	226,861
July	334,692	235,850*	164,445	49,018	60,343	75,779	383,710	296,193*	240,224
Aug.	334,106	230,167*	171,052	47,724	63,597	80,439	381,830	293,764*	251,491
Sept.	331,121	233,336*	182,556	43,413	62,240	83,288	374,534	295,576*	265,844
Oct.	322,857	224,000*	195,685	49,913	67,825	80,653	371,770	291,825*	276,338
Nov.	308,993	212,515		46,588	73,691		355,581	286,206	
Dec.	303,000	218,844		39,094	56,567		342,094	275,411	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1935	London 1936	London 1937	Liverpool 1935	Liverpool 1936	Liverpool 1937
January	81,807	84,791	29,005	66,405	77,188	41,895
February	87,605	79,757	26,508	67,983	77,138	37,078
March	92,664	74,779	21,292	69,218	72,823	30,622
April	94,361	68,932	21,128	70,584	71,388	27,443
May	95,722	61,349	21,351	71,927	69,150	25,081
June	98,077	55,993	21,964	73,131	66,173	21,258
July	99,226	49,575	22,589	74,915	63,715	19,424
August	101,574	45,749	25,211	75,584	62,367	19,817
September	101,198	44,364	28,462	76,263	59,485	21,190
October	94,749	40,777	30,465	76,400	55,738	21,327
November	90,542	37,495		76,301	51,184	
December	86,551	33,027		77,589	45,291	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1936					
November	26,761	33,469	3,415	588	1,948
December	26,969	35,145	5,161	409	2,454
At end of 1937					
January	36,365	41,911	5,024	290	4,005
February	42,132	44,346	5,855	197	3,763
March	42,485	40,317	3,477	108	4,078
April	38,812	38,443	3,745	101	3,840
May	34,234	40,253	3,781	94	3,559*
June	45,085	48,545	4,558	98	1,019
July	44,776	43,270	3,725	124	1,050
August	47,886	44,775	4,454	144	1,133
September	49,448		5,294		1,543

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of: 1936:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
October	67,825	20,790	17,385	106,000
November	73,691	19,270	13,039	106,000
December	56,567	24,800	21,633	103,000
End of: 1937				
January	55,096	24,920	17,984	98,000
February	53,538	27,250	13,212	94,000
March	56,994	31,240	36,766	125,000
April	72,530	34,410	17,060	124,000
May	58,542	31,500	26,958	117,000
June	57,215	34,700	33,085	125,000
July	75,779	45,100	23,121	144,000
August	80,439	40,300	19,261	140,000
September	83,288	37,000P	20,712	141,000
October	80,653	35,000P	17,347	133,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1932	1933	1934	1935	1936*	1937
January	623,416*	634,797	661,948	698,153	600,479	454,249*
February	611,819*	626,227	663,308	686,195	599,355	445,265*
March	614,894*	638,428	666,382	678,809	583,318	447,856*
April	615,893*	629,159	659,796	677,006	567,172	428,249*
May	612,474*	626,537	689,239	677,569	541,871	413,134*
June	595,712	613,055	672,804	671,525	520,255	433,257*
July	589,037	618,258	676,200	679,061	519,074	445,782
August	597,274	617,449	674,702	680,644	500,520	457,462
September	599,986	623,683	694,361	661,509	493,585	470,768*
October	609,368	636,597	680,616	655,000	486,159	477,398
November	614,342	642,968	684,408	617,300*	466,491	.....
December	629,898	654,890	705,975	613,987*	466,576	.....
Monthly Avge.	609,502*	630,171	677,395	666,397*	528,738	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,726	50,965	48,740	40,085	45,303	47,233	49,362	58,116
Shipments	69,395	53,638	50,061	40,251	44,094	46,687	50,183	55,363
Inventory [2]	11,838	9,003	7,775	7,644	8,888	9,455	8,196	11,114

Figures for Recent Months

	PRODUCTION 1935	PRODUCTION 1936*	PRODUCTION 1937	SHIPMENTS 1935	SHIPMENTS 1936*	SHIPMENTS 1937	INVENTORY 1935	INVENTORY 1936*	INVENTORY 1937
Jan.	4,626	4,579	4,980	3,663	3,875	4,509	10,398	8,917	11,377
Feb.	4,383	3,579	5,246	3,287	3,212	4,371	11,530	9,265	12 308
Mar.	4,346	3,640	5,916	4,204	3,857	5,787	11,675	9,087	12.448
Apr.	4,512	4,857	5,730	5,144	4,904	5,560	11,003	9,035	12,629
May	4,175	4,974	5,352	4,067	5,833	5,375	11,131	8,178	12,592
June	3,910	5,612	5,339	4,262	5,793	5,389	10,755	7,825	12,529
July	3,532	5,466	4,292	5,447	5,744	5,190	8,850	7,750	11,654
Aug.	3,993	5,017		4,739	4,977		7,805	7,799	
Sept.	3,787	4,984		3,303	3,837		8,288	9,012	
Oct.	4,051	5,126		4,055	4,082		8,291	10,096	
Nov.	3,997	4,972		3,930	4,233		8,249	10,823	
Dec.	4,051	5,311		4,081	5,016		8,196	11,114	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,829	52,420	48,333	36,891	42,556	46,228	47,879	57,607
Shipments	70,592	54,938	50,021	37,911	41,391	45,046	48,067	54,626
Inventory [2]	12,807	9,999	7,922	6,749	7,815	9,180	8,231	10,985

Figures for Recent Months

	PRODUCTION 1935	PRODUCTION 1936	PRODUCTION 1937	SHIPMENTS 1935	SHIPMENTS 1936	SHIPMENTS 1937	INVENTORY 1935	INVENTORY 1936	INVENTORY 1937
Jan.	4,259	4,592	4,801	3,722	4,168	4,391	9,621	8,623	11,100
Feb.	4,171	3,556	5,091	3,362	3,446	4,536	10,466	8,699	11,734
Mar.	4,123	3,787	5,823	4,168	3,796	5,570	10,406	8,692	11,904
Apr.	4,259	4,824	5,627	4,453	4,746	5,325	10,170	8,788	12,218
May	3,892	4,819	4,956	3,451	4,919	5,028	10,615	8,719	12,107
June	3,480	5,035	4,716	4,024	5,504	5,027	10,050	8,105	11,74c
July	3,251	5,177	4,019	5,269	5,758	5,046	8,005	7,725	10,869
Aug.	3,894	5,039		4,556	5,136		6,939	7,621	
Sept.	4,125	5,161		3,426	4,231		7,565	8,627	
Oct.	4,435	5,397		3,987	4,108		8,053	9,977	
Nov.	3,942	4,739		3,687	3,995		8,161	10,732	
Dec.	4,048	5,121		3,962	4,819		8,231	10,985	

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1936							
Dec.*	498,710	425,365	73,345	20,411	16,542	3,869	519,121
1937							
Jan.*	380,051	309,637	70,414	19,583	14,697*	4,886*	399,634
Feb.*	363,991	296,636	67,355	19,707	14,173*	5,534*	383,698
Mar.*	494,276	403,879	90,397	24,901*	19,127*	5,774*	519,177
Apr.	536,334	439,980	96,354	17,081	12,927	4,154	553,415
May	516,899	425,432	91,467	23,458	17,980	5,478	540,357
June	497,298	411,394	85,904	23,841	17,919	5,922	521,139
July*	438,968	360,403	78,565	17,941	12,513	5,428	456,909
Aug.	394,322	311,456	82,866	10,742	5,814	4,928	405,064
Sept.	171,203	118,671	52,532	4,417	1,926	2,491	175,620
Oct.	329,876	298,662	31,214	8,103	7,378	725	337,979

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								DUTCH EAST INDIES [6]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [3]	Siam [4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [3]	Amazon Valley	All Other [6]	World Total [7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1936:															
Feb.	38,436	18,857	19,579	3,664	1,382	2,107	529	3,663	4,789	6,643	15,851	2,892	1,201	1,051	63,353
Mar.	46,552	12,026	34,526	4,336	1,324	1,848	342	2,966	4,484	5,052	9,225	2,553	1,264	751	68,671
Apr.	36,251	14,702	21,549	3,172	1,230	2,053	869	1,596	4,895	6,446	13,032	2,416	1,056	947	59,261
May	46,568	12,527	34,041	2,560	1,117	2,354	517	2,077	4,258	6,015	10,766	2,281	956	776	67,718
June	40,049	15,026	25,023	3,766	1,226	1,386	461	3,737	4,577	6,519	14,588	2,733	917	823	65,756
July	53,114	19,038	34,076	3,773	1,359	1,399	1,035	3,734	6,133	8,578	17,946	2,738	964	933	82,668
Aug.	43,506	13,361	30,145	3,940	776	2,541	656	3,284	4,978	7,353	12,106	3,017	542	1,054	70,392
Sept.	44,110	10,039	34,071	5,367	664	1,139	537	3,259	4,531	6,241	10,175	3,505	1,119	937	71,545
Oct.	46,543	12,960	33,583	5,599	1,181	2,143	1,086	3,349	6,477	8,145	12,881	3,874	1,255	1,105	80,678
Nov.	47,342	16,923	30,419	4,960	1,322	1,950	701	2,260	5,398	7,109	16,718	3,872	1,592	1,163	77,464
Dec.	38,714	9,758	28,956	4,377	1,844		506	2,988	6,472	10,129	9,536	8,450	1,721	1,087	76,072
1937:															
Jan.	41,571	16,956	24,615	4,541	1,077	4,063	1,234	3,849	5,136	8,011	13,102	2,828	1,271	1,000*	70,727
Feb.	38,058	14,048	24,010	5,619	1,831	2,043	790	3,554	5,484	7,656	12,414	3,074	1,692	1,000*	69,167
Mar.	59,568	19,579	39,989	7,066	2,040	1,425	1,239	3,873	7,791	11,848	19,969	3,173	1,749	1,000*	101,162
Apr.	58,718	17,136	41,582	3,423	1,203	2,960	783	1,899	6,999	8,967	15,989	2,094	1,522	1,000*	88,421
May	51,152	17,350	33,802	4,612	1,012	742	778	2,238	7,530	8,981	21,085	2,887	1,063	1,000*	85,730
June	54,809	23,614	31,195	5,180	1,100	1,890	813	2,933	8,269	12,467	25,225	3,669	762	1,000*	94,503
July	72,704	26,100	46,604	6,285	976	2,543	1,414	3,195	7,512	11,610	23,913	5,563	854	1,000*	111,469
Aug.	64,525	21,398	43,127	7,336	605	1,624	1,189	2,999	6,785	11,635	21,054	2,272	1,248	1,000*	100,874
Sept.	67,414	19,065	48,349	5,771	1,092	2,659	969	3,173	6,402	10,882	19,371	4,128	1,007	1,000*	104,803
Oct.	59,319	11,858	47,461	6,702	1,178	523	1,505	2,265		34,380		3,751	1,000*	1,000*	98,260
Nov.	57,850														

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,024	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	17,000*	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,976
1936:															
July	38,556	—766	4,621	6,837	2,274	5,126	2,000*	1,733	1,363	713	183	1,094	500*	495	64,729
Aug.	41,094	—1,581	4,513	6,556	3,781	4,305	1,500*	3,128	807	789	42	1,145	500*	989	67,440
Sept.	49,483	—12	4,393	6,006	2,393	5,195	1,500*	2,922	2,297	514	471	1,090	300*	624	77,176
Oct.	40,301	—87	4,752	7,232	3,110	6,600	1,500*	2,761	1,092	817	343	1,171	200*	1,026	70,818
Nov.	37,897	—742	3,282	6,500	4,308	3,961	1,500*	2,162	964	1,090	445	1,388	200*	823	63,778
Dec.	50,838	—4,926	4,688	7,458	1,193	8,698	1,500*	3,426	1,184	759	276	1,206	200*	1,701	78,201
1937:															
Jan.	42,655	33	4,430	7,041	1,632	8,357	1,700	2,633	582	854	269	1,115	200*	567	72,368
Feb.	44,398	—222	5,296	7,911	1,271	6,630	1,502	3,048	304	1,363	245	452	200*	837	73,233
Mar.	39,888	343	5,347	7,668	2,612	6,935	2,119	3,598	1,293	1,641	371	709	200*	601	72,727
Apr.	42,066	3,808	5,291	8,664	1,343	5,837	1,669	1,532	1,058	1,069	362	1,070	200*	1,445	80,414
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157	6,010	6,469	3,791	7,608	1,958	3,940	2,226	1,630	521	1,802	200*	1,150	91,434
July	43,018	10,628	4,306	7,860	1,946	4,851	2,719	2,150	1,902	851	497	1,409	200*	753	83,090
Sept.	56,685	15,671	4,820	10,595	2,396	3,666	1,941	1,391	3,184	1,258	337	1,648	200*	1,369	105,161
Oct.	52,926	11,899		8,076					2,470		367				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

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